THE IRON AGE

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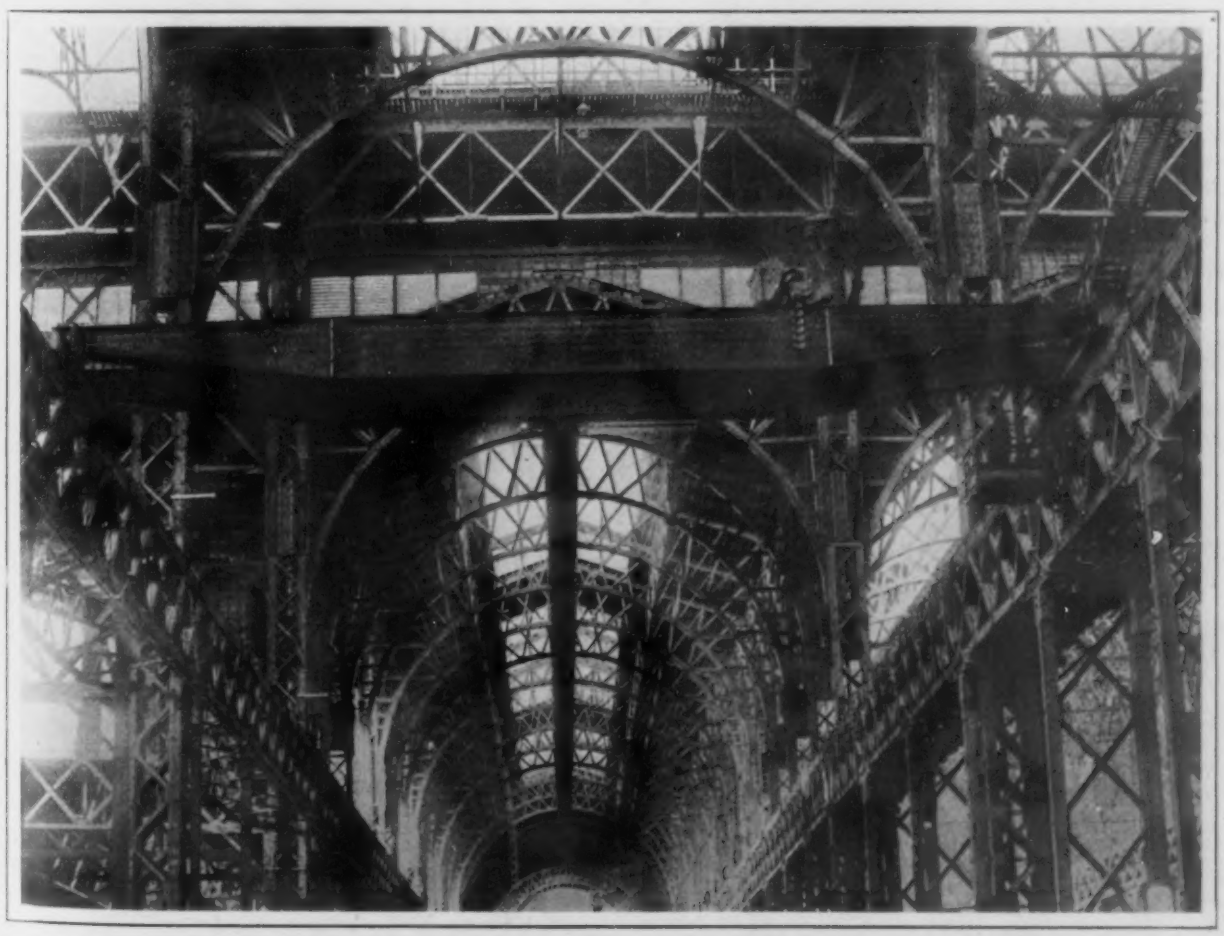
Machinery Hall Cranes, Panama Exposition

Means for Transporting Exhibits and Handling Heavy Materials in Machinery Demonstrations at the San Francisco World's Fair

For handling and installing the various exhibits in Machinery Hall at the Panama-Pacific International Exposition, four cranes of the electric traveling bridge type have been put in use. Machinery Hall, which is said to be the largest timber frame building ever constructed, is traversed from north to south, its greatest dimension, by three aisles, each 75 ft. wide. Owing to the great hight of the roof, it was possible to place the cranes at a considerable distance from the floor. The aisles are 937 ft. in length and the cranes operate the entire distance.

In the central aisle two 30-ton cranes have been installed. These may be operated separately or in unison. When operated together, they represent a lifting and carrying capacity of 60 tons. The two cranes are equipped with four alternating-current motors and have an auxiliary hoisting drum. A 20-ton crane is used in each side aisle and is equipped with three alternating-current motors. All the cranes have the cab control, the cab to be suspended at one end of the crane. The cranes are of the box girder type, and were constructed and installed by the Cyclops Iron Works, San Francisco.

The steel rails on which the cranes run are laid on timber trusses of the Howe type, as indicated in the accompanying illustration. The trusses, which run up to 9 ft. in depth, are designed strong enough to carry any load which the cranes will handle. The rails are 50 ft. 8 in. from the floor, an unusual hight. The posts which support the roof and are spaced 26 ft. apart, carry the trusses. The timbers used in the truss girders run from 12 to 18 in. in thickness. The posts rest on pile footings designed to carry 20 tons each.



One of the Four Electric Traveling Cranes in the Monumental Timber Structure for Machinery Exhibits

The Elimination of Seams in Steel Rails*

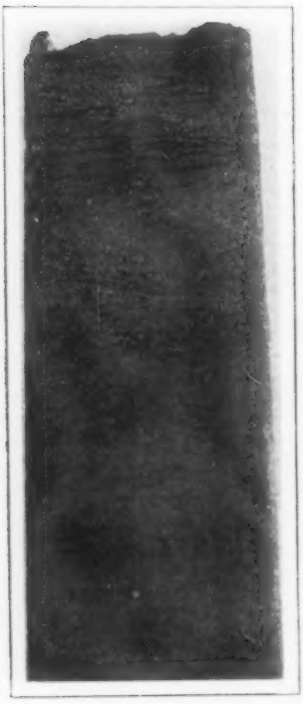


Fig. 1—Face of an Ingot Before Heating

Partly-Formed Rolled Products Milled at Lackawanna Steel Works to Remove Seam-Forming Apertures and Decarburized Ingot Surfaces

BY ROBERT W. HUNT

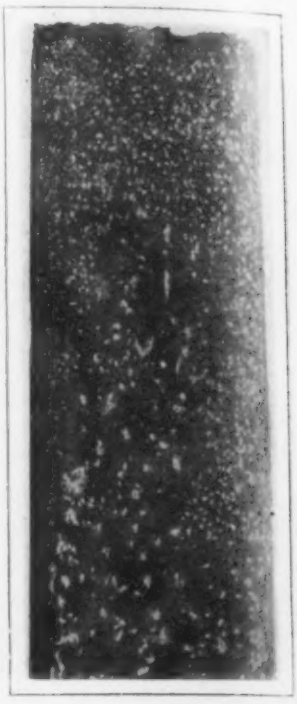


Fig. 2—After Heating, Adhering Scale Removed

Increased weight of rolling stock and speed of traffic have necessitated increasing the size of the rail sections, and hence their weight; and as many of the details of rail manufacture have been changed with such alterations, it is not surprising that new and unexpected physical weaknesses developed in the heavier rails. One of the most notable was failure through crescent-shaped pieces breaking out of the rail flanges, followed by at least one, and in many cases several, ruptures across the whole section of the rail. Investigation showed that in practically every instance of such failure there was a more or less pronounced seam running longitudinally in the bottom of the rail near its center, and thus immediately under its web. This seam occurs at the top of the curve of the crescent-shaped break and it is undoubtedly the point at which the fracture starts.

It is true that rails with actual flaws in their flanges have been rejected as first quality ones and that a very pronounced seamy condition of the bottom of the rail would also cause its rejection. Such rejections were the cause of frequent disputes between the mill operatives and the inspectors, the point being as to how far the inspectors were warranted in carrying their condemnation; but, as already said, it was not felt that a single seam, unless very pronounced, would be dangerous.

The crescent-shaped breaks were of such frequent occurrence that they indicated a very serious condition and led rail makers to experiment with the design of their rolling passes with a view to obviating the formation of the bottom seams. It was found that fewer seams were produced by such changes, but they were not entirely eliminated. While more or less successful in preventing the formation of seams through lapping on the bottom of the rails, the formation of seams in other parts of the section was not particularly affected.

T. H. Mathias, assistant general superintendent of the Lackawanna Steel Company, determined that the most certain way of getting rid of seams was to remove that portion of the metal which contained them, and, as applied to steel rails, thus to eliminate them from both the base and head of the rail. This was a reasonable assumption, but its execution, I think, would have seemed very impractical to most metallurgical engineers. Mr. Mathias reasoned that the primary causes of seams

*Paper, substantially in full, read before the American Society of Mechanical Engineers, New York, December 3.

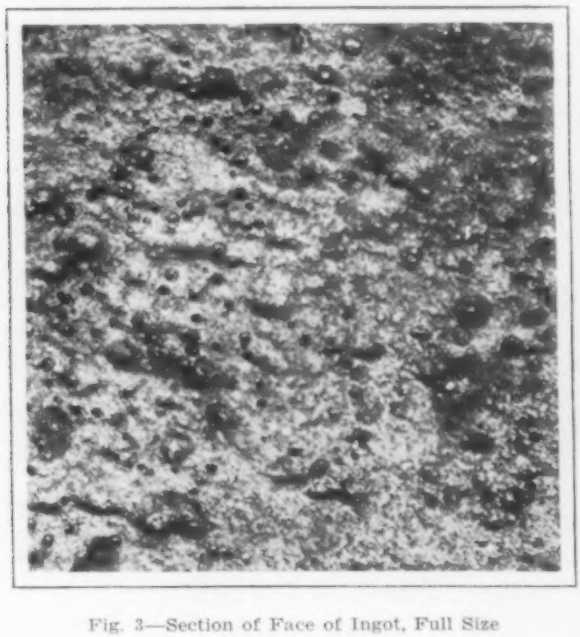


Fig. 3—Section of Face of Ingot, Full Size

Fig. 4—Etched Surface Showing Lower Carbon Skin of Ingot

existed previous to any rolling of the steel, in fact, were incident to the casting of the molten metal into ingots. He knew that disk-like apertures were formed on the sides of ingots while the molten metal was being cast and were probably caused from air being entrapped against the sides of the ingot molds by the hot steel as it rose in the molds, a condition which was not controlled in regular manufacturing routine. This condition is illustrated by Figs. 1 and 2, which are photographs of the same face of an ingot, Fig. 1 showing the side as it would appear before heating, while Fig. 2 shows it after heating, with the adhering scale removed. Fig. 3 represents the actual size of a section of a face of such an ingot, and gives an illustration of how serious such apertures may be. It will be appreciated that, as the section of the ingot is reduced and elongated in the rolling process, so, of course, will the apertures be stretched longitudinally and thus be formed into seams.

Mr. Mathias demonstrated that there is another constant condition present in the rolling of large steel ingots, in the formation of a decarburized surface on all of their four faces, about 5/16 in. deep, and containing from 8 to 10 points lower carbon than the metal immediately under it, the decarburized envelope undoubtedly being produced through the oxidizing conditions to which ingots are subjected in the soaking pits where they are heated preparatory to rolling. A thick oxide scale is always formed on the surface of ingots in the pits, so that conditions are invariably present for the production of such a layer of lower carbon metal on their outside faces. Fig. 4 illustrates the presence of this lower carbon envelope or skin. It shows a polished and etched cross-section of a part of an ingot which has been heated to a rolling temperature in the soaking pits but not rolled, from which it will be realized that ingots of large section have both disk-like apertures on their four faces and a decarburized envelope in which they are contained.

Mr. Mathias was convinced that during the process of rolling ingots into rails it was practical to remove mechanically the parts of the enveloping steel which would form the top of the head and bottom of the flange of the rail, and experimented accordingly. He designed and his company installed as an addition to their rail train, a milling, or a hot sawing machine, as I believe Mr. Mathias designates it, to cut off hot metal without retarding the regular operation or thus interfering with the production of the mill. This is illustrated by Fig. 5, which is a photograph of the machine in operation. The machine is located in echelon in relation to the rest of the rail train.

The ingot is reduced in the blooming rolls to an 8 x 8 in. cross-section and after cropping the ends the bloom is further reduced in the roughing or shaping stand of rolls by five passes. When it leaves these rolls, it is approximately 75 per cent. finished and at this period it is carried to the right and entered between two pinch rolls with its base or flange side up. A bar which will make four 33-ft. rails is at this point in the rolling operation about 60 ft. in length; therefore, the area of metal to be cut off or removed in the milling machine is approximately ⅛ in. deep, 7 in. wide and 60 ft. long. It is driven through the pinch rolls at a rate of 60 ft. in 30 seconds. The pinch rolls have a draft of about ⅜ in. and thus force the bar between the two milling saws, which are so arranged in the housing that they may be raised or lowered as desired. From 1/32 to 3/64 in. of metal is milled from the head and base of the bar, the front end of which, immediately on passing from between the rolls, is caught by a second set of pinch rolls which have a draft of about 1/16 in. These pinch rolls force the bar between the tools, pull it from between them, and also hold it in practically perfect line for the milling operation. The milling apparatus is driven electrically and requires about 600 hp. for its operation.

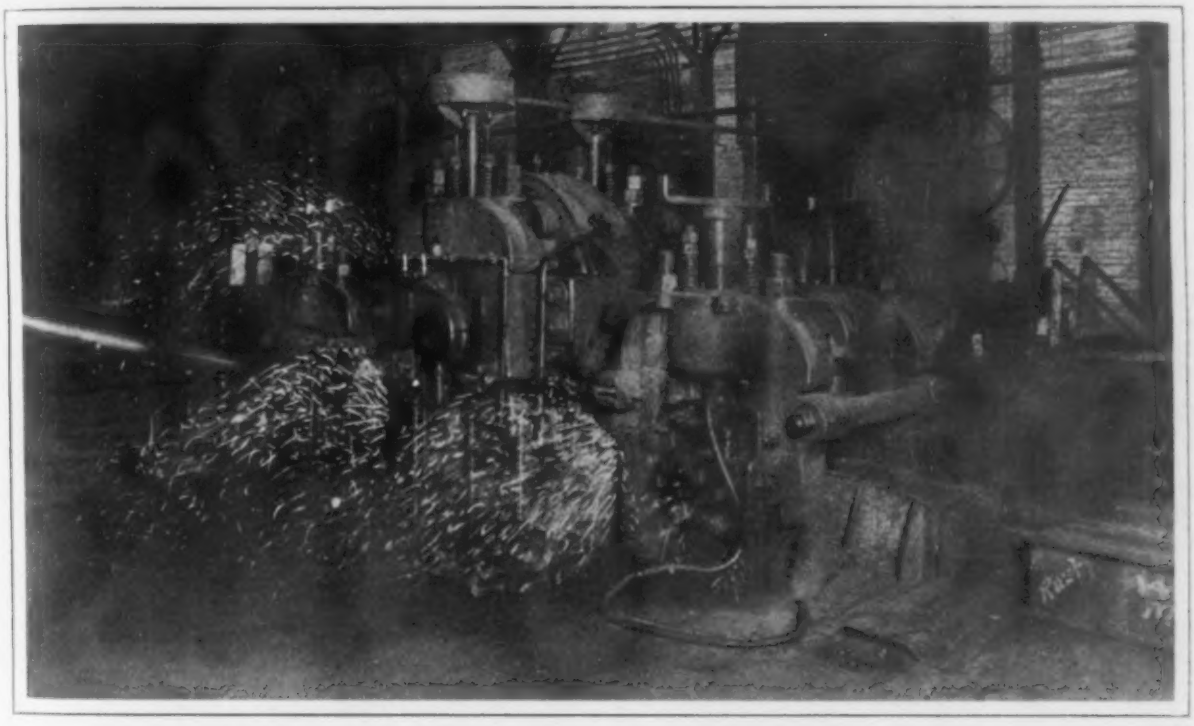


Fig. 5—Hot Sawing or Milling Machine in Operation

Fig. 6 shows an etched cross-section of the piece preparatory to its entering the milling machine, and on it is clearly shown the enveloping layer of lower carbon steel. As stated, it is treated with the wider, or flange side up.

As the milled dust or particles of steel are

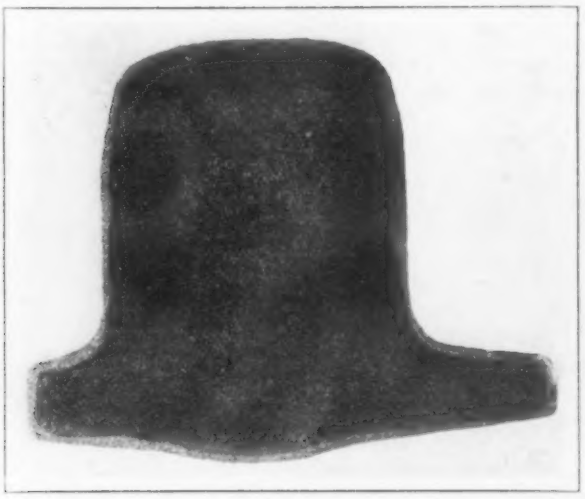


Fig. 6—Cross-section of Bar Before Entering Machine

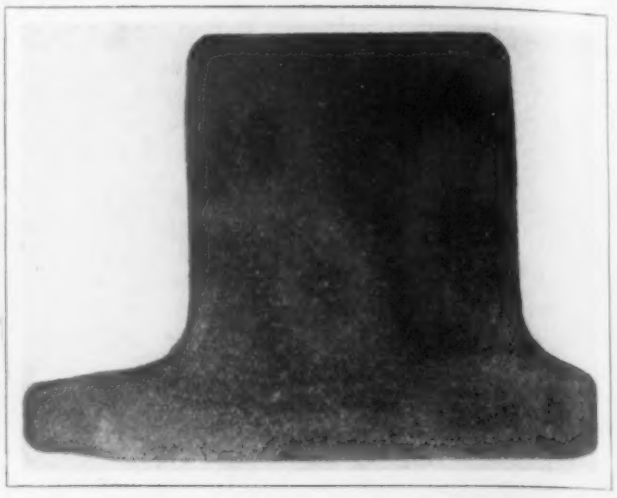


Fig. 9—The Bar After It Leaves the Milling Machine

thrown out, they are hit by water under pressure which forces them into a chute and also prevents the material from adhering together. By the chute they are carried below the mill and caught in boxes or receptacles suitable for charging as scrap into the open-hearth furnaces. Fig. 7 shows the condition of the accumulated material which, as will be seen, is in regular open-hearth furnace charging boxes.

Fig. 8 shows one of the milling tools. It is 5 ft. in diameter with an 8-in. width of face and revolves at a peripheral speed of 2500 ft. per minute, thus causing an engagement of about 400,000 teeth per minute on the hot rail bar. The teeth are of 0.80 carbon steel, and it has been demonstrated that they will mill at least 30,000 tons of material without requiring dressing. The one shown had milled about 15,000 tons.

Fig. 9 presents the shape of the bar after it leaves the milling machine preparatory to further reduction in the regular rail rolls. It will be noticed that the milling on the flange has not reached the extreme edges of the bar, and on the head side has not affected the corners, and it will be recalled that Fig. 8 showed the milling tool with a straight face. It is apparent that either by a modification of the shape of the piece as presented for treatment in the milling machine or, what will probably be more practical, changing the face of the tool, the milling can be extended to the extreme edge of the flange portion of the bar and somewhat around the corners of the top or head side. This will undoubtedly be perfectly practical and thereby eliminate the seams which may be located in those parts of the bar. Such elimination is not accomplished at present, and perhaps it may not be necessary. The primary object was to eliminate the seams from the central portion of the bottom of the rail which had been the starting point of the moonshaped failures, and to remove them from the top or bearing surface of the head of the rail. Personally I think it will be desirable to extend the milling by the use of convex-faced tools.

The work of rolling which the steel receives after the removal of the more or less laminated metal must produce a better product than if such elimination had not taken place, and, in the case of steel rails, it should not only make them less liable to breakage on account of seams in their flanges, but also enable them better to resist the abrasive effects of traffic.

During the many years of my connection with rail making I have examined a great many etched specimens of rails, not only directly in connection with the process under consideration, but for various other reasons. From such experience I can fully appreciate what Mr. Mathias has accomplished. The surfaces of practically all rails, when etched, will show some seams on both base and head, and very frequently the extent of such defects will not be appreciable if the scale has not been removed. Even then, it is not always an easy or certain matter to estimate the depth of the seams. When the rails have been subjected to the Mathias milling operation and still show pronounced seams,

Fig. 7—Cuttings Produced by Milling

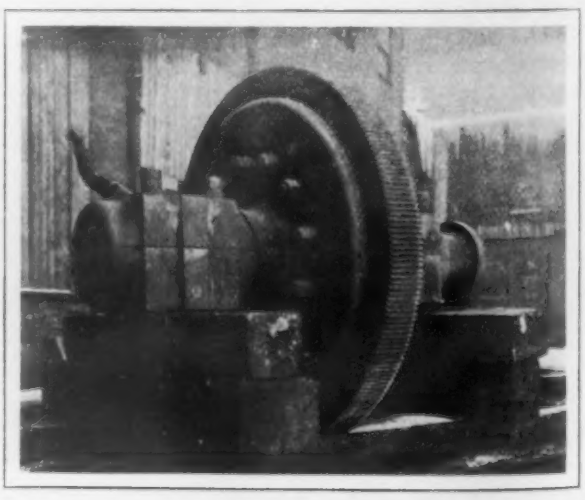
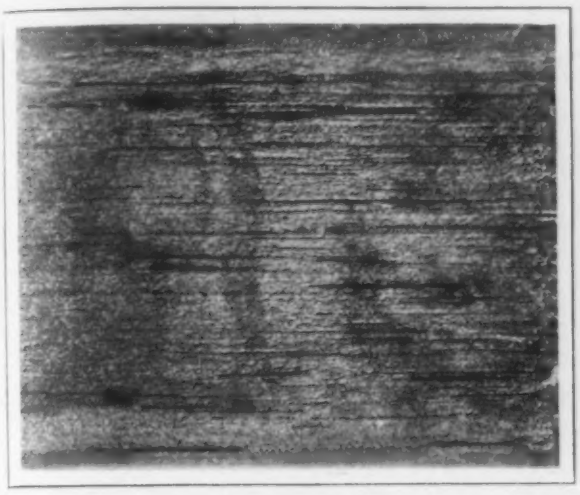


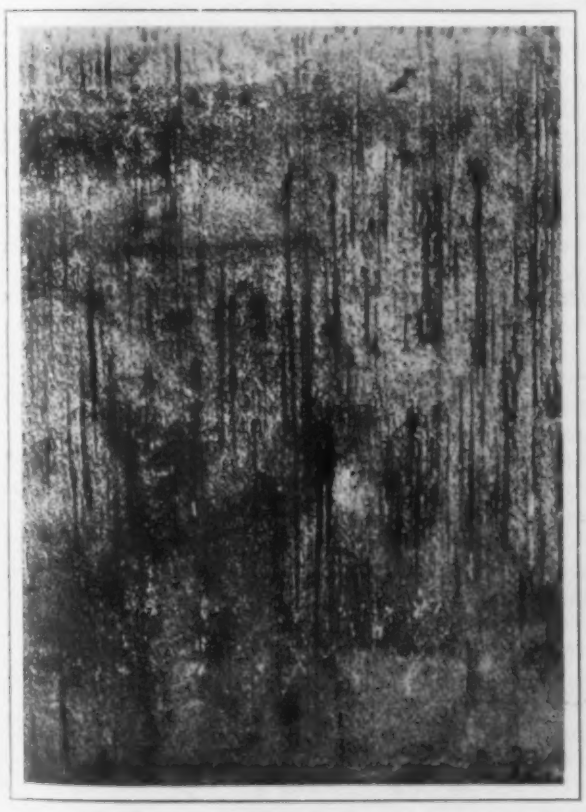
Fig. 8—The Milling Tool

it has been found that breaking tests will practically always develop the fact that the suspicious marking is an actual seam.

To illustrate the appearance of many ordinary steel rails of commerce when etched, Figs. 10 and 11 show the surfaces of both heads and flanges. These specimens were taken from rails made by several different makers, including the Lackawanna Steel Company. These illustrations not only clearly show the field for such an operation as I have described, but also the extent to which Mr. Mathias has been able to accomplish it.



Top Surface

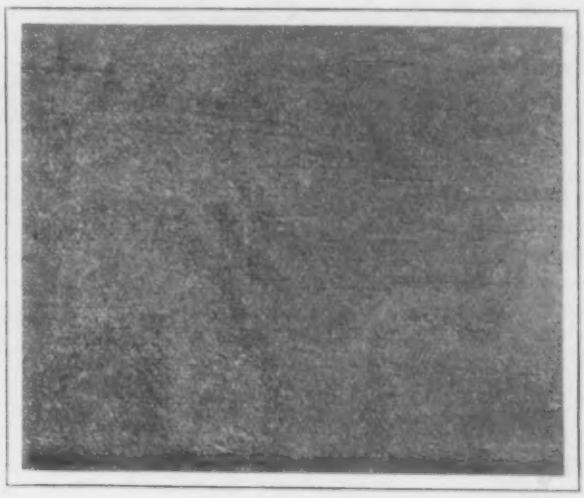


Bottom Surface
Fig. 10—Untreated Rail

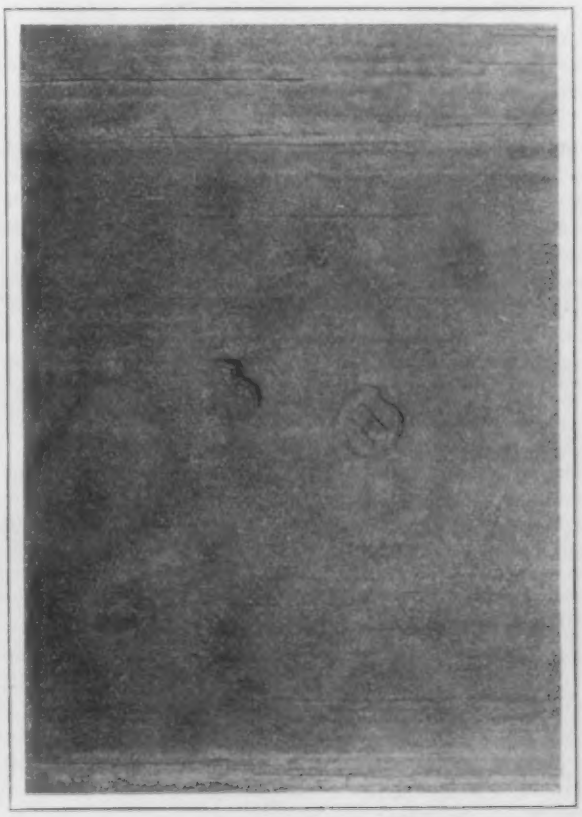
While I have confined myself to the matter of steel rails, it is patent that the process will be of great value in the preparation of blooms for axles and all other kinds of forgings. As is well known, it is practically the universal custom to endeavor to remove the seams developed in rolling axle billets by chipping them out through the use of pneumatic hammers, and for some of the higher characters of forgings, notably for automobile parts, the endeavor to eliminate the seams is carried to the extent of turning off the whole surface of the billets. I am confident that by the Mathias plan the greater part, if not all, of such work can be superseded, and I regard the invention and its practical installation as a notable achievement in the art.

The Discussion

The paper was discussed by Henry D. Hibbard, Plainfield, N. J., who characterized the Mathias procedure, not unfavorably in itself, as curing something which ought not to exist; by James E. Howard, engineer-physicist of the Interstate Commerce Commission; by Max H. Wickhorst, engineer of tests of the rail committee of the American Railway Engineering Association, and by Dr. P. H. Dudley, consulting engineer for the New York Central Lines. In concluding his presentation of the paper, Cap-



Top Surface



Bottom Surface
Fig. 11—Milled Rail

tain Hunt mentioned that the percentage of second-class rails had been so much reduced by the use of the milling machine that the Lackawanna Steel Company does not regard it as costing anything to do the additional work on the rails. An abstract of the discussion follows:

BY JAMES E. HOWARD

Mr. Mathias has set out to remove by a mechanical process defects attributed to the primitive condition of the surface of the ingot, and in so doing incidentally effects the removal of some partially decarburized steel which would finally be found on the running surface of the head and the lower surface of the base, the two important surfaces in the use of the rail.

The unfavorable influence which attends the presence of soft surface metal, when located over a hard steel core, and exposed to wheel pressures at the running surface of the head, is manifest, particularly when interior streaks or seaminess is present. Such metal by reason of its low resistance against lateral flow promotes the formation of longitudinal seams in the rail. It augments the wedging and splitting tendency of the wheel loads when their effects, in penetrating the metal of the head, shall have encountered interior streaks or lamination.

Occasion was taken in a report issued by the Interstate Commerce Commission under date of May 8, 1912, pertaining to a derailment on the Great Northern Railway, to refer to a difference of 16 points in carbon between the center of the head and the metal near the running surface in the rail which was responsible for that derailment. Still earlier, Tests of Metals, 1909, showed a difference of 28 points in carbon between the center and the sides of the head of a 75-lb. rail.

Such occurrences are common and their frequency constitutes a sufficient basis for the claim advanced by Mr. Mathias that one of the features of his process consists of the removal of partly decarburized metal, in cases where it exists on the surfaces of the ingots. However, less anxiety attaches to the presence of decarburized surface metal at the base than at the head of the rail. In fact, the evidence furnished by rails in service does not make it conclusive that soft steel at the immediate surface of the base is at that place necessarily disadvantageous. Soft steel may display the functions of a deterrent against the detrimental influence of seaminess in such places. The mechanical removal of surface defects is a step in the direction of furnishing safer rails, and as such is commendable.

Prevalence of Interior Streaks in Rails

It is appropriate, however, at this time, to mention the prevalence of interior streaks in some rails. Such streaks are the cause of many rail failures, and they should be eliminated if it is feasible to do so. The examination of the metal of a 100-lb. rail of recent manufacture, an A rail, showed the presence of 22 seams in the metal of the head, ranging in length from ½ to 5½ in., and at various depths up to ¾ in. Some were at the surface, but generally they were most prevalent at depths of ⅛ to ⅜ in. below the running surface. Those of the base were found at depths up to 9/16 in. measured from the lower surface, lengths from ½ to 7½ in., and in from the edge of the flange 1 to 2¾ in. Twenty-three of these base seams were disclosed in this rail. Other rails from other heats and other parts of the ingot were free from interior streaks, so far as disclosed by the examination that was made of them.

By milling the metal from the rail bar, interior defects are necessarily brought nearer the rolled surfaces of the finished rails, a circumstance which may to advantage be observed when the rails reach the track, in order to note whether or not there are any attending disadvantages resulting from the removal of some parts of the primitive cross-section.

BY DR. P. H. DUDLEY

The design of the hot-milling machine by Mr. Mathias is one of the indications of the growing co-operation between the manufacturer and consumer to remove minor surface defects in steel rails, which defects a few years ago under lighter wheel loads were of less significance.

The consumers of steel rails in the past six to eight years, by the adoption of basic open-hearth steel for rails, have reduced the breakages and failures to a marked extent. This has increased the cost to the railway companies over 7 per cent. to replace Bessemer steel rails of 0.10 per cent. phosphorus and about 0.50 per cent. carbon by a steel of 0.62 to 0.75 per cent. carbon, and under 0.04 per cent. in phosphorus for 100-lb. rails. The checking of the basic open-hearth ingots in blooming is not nearly so frequent as in Bessemer ingots, and the half-moon, or crescent-shaped breaks, have been reduced in the same sections of rails, nearly in the proportion of one open-hearth to about 50 in the Bessemer product. Mr. Mathias expects to be able, with his hot-milling machine, to reduce even the smaller percentage for the basic open-hearth rails mentioned, and this will be of advantage to the railway companies.

Less Injurious Rail-Straightening Method Wanted

The straightening presses formerly had a vertical movement of about 1 in. of the head, and made 48 strokes per minute. Some of those old presses have since been altered for a vertical movement of 2 in. of the head and make the same number of strokes per minute. The injury to the rails is not only greater, but the permanent sets have become of such an extent that half-moon breaks have developed from those checks in the base after a short service in the track.

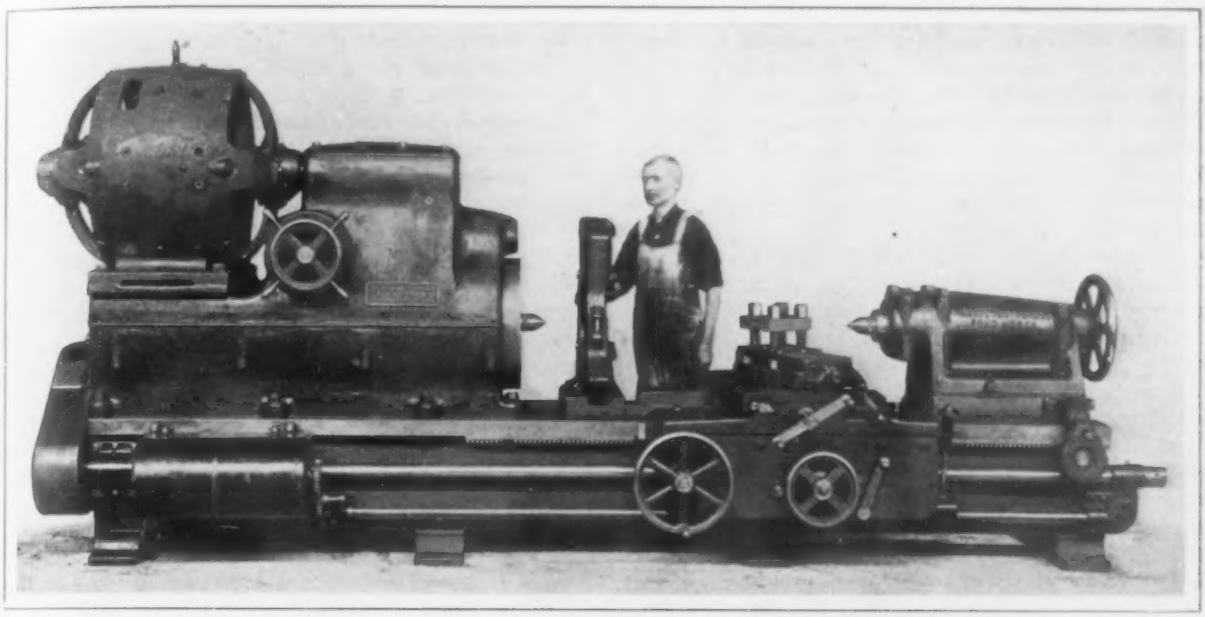
Years ago when I could take the time to walk over the track after new rails were laid I found many half-moon breaks between the ties in the bases of rails gagged under the presses with 2-in. head movement, due to the subsequent development of the strains left in the metal to straighten the rails. It has been noticed in new Bessemer steel rails which have been piled 6 to 8 months that many half-moon checks had completed their development as fractures, became detached and were found when the rails were loaded for distribution upon the track.

It is a misconception of the relations of the wheel contacts on the bearing surface of the rail heads that as the wheel loads have increased, the areas of the contacts between each have been reduced by the recent coning and shape of the wheel tread contours. The Pennsylvania Railroad Company has made its new 125-lb. rail for trial with a head 3 in. wide. The New York Central & Hudson River and the Boston & Albany Railroad companies have used a rail head 3 in. wide for 22 and 23 years, respectively.

The consumers hope there will be soon an installation of less injurious methods to straighten the rails of the stiffer sections than those now in use, since Mr. Mathias has introduced his "hot miller" to remove seams from head and base.

Heavy 30-In. Projectile Turning Lathe

The Niles-Bement-Pond Company, 111 Broadway, New York City, has recently built several heavy and powerful 30-in. lathes. These are driven by a 35-hp. motor and are intended for turning armor piercing projectiles up to a maximum diameter of 14 in. They are designed to be used on the tough and hard steel forgings entering into the construction of this form of ammunition.



A 30-In. Heavy Motor-Driven Lathe Designed for Turning Armor Piercing Projectiles Up to a Maximum Diameter of 14 In.

Some idea of the construction of these tools can be gathered from the accompanying illustration. The headstock, which is completely inclosed, has been provided with a bearing of 71 in. on the bed, which is relied upon to provide a rigid support for the spindle, gearing and the driving motor. The bearings for all of the rotating shafts are lined with bronze bushings and together with the gears are oiled from a tank in the headstock which is kept filled by a pump which takes its supply from a second tank in the bed. All of the gearing is of steel, and the motor pinion and the gear that meshes with it have herringbone teeth. The front spindle bearing is 18½ in. long and 6½ in. in diameter, and the end thrust of the spindle is taken on hardened steel and bronze washers. It is pointed out that this arrangement eliminates the tendency of the upward thrust of the tool to lift the spindle in its bearings. A direct-connected motor drives the faceplate through gearing at speeds ranging from 11 to 152 r.p.m. In all there are 40 speeds available, which are secured by a 3 to 1 speed variation in the motor itself and augmented by a set of change gears. A handle on the carriage enables the faceplate to be started, stopped or reversed or any one of the various speeds secured without it being necessary for the operator to leave his working position at the carriage.

The carriage, which has a bearing on the bed for its entire length, both front and rear, is gibbed underneath the track, both inside and out. Nine reversible feeds are provided, which range from 1-64 to ¼ in. per revolution of the spindle. Three of these can be secured by a sliding key without removing any gears, and both hand and power cross feeds are provided. The tool carriage has a compound swiveling rest and the tool slide is provided with four large clamping bolts and straps. All the parts upon the carriage proper are of steel.

Although the tailstock is of rigid construction, its section is increased considerably toward the end carrying the tailstock center. A crank wrench and gearing engaging the steel feed rack enables it to be traversed rapidly in spite of its weight. A tail brace which engages a rack in the bed near the front track is relied upon to prevent any possibility of the tailstock slipping under heavy loads and serves to reinforce the four 1½-in. clamping bolts and the steel clamps with which the tailstock is provided.

New Line of Magnetic Lock-Out Switches

The Cutler-Hammer Mfg. Company, Milwaukee, Wis., has developed a new line of magnetic lock-out switches, including one of the series coil operated type and a redesigned form of shunt coil operated switch. The line is made in 11 sizes, with capacities ranging from 50 to 3600 amperes, and is intended particularly for use in connection with the automatic starting of motors. One of the features of the switch is that it will remain open when the current passing through its windings exceeds a predetermined adjustable value and when the current falls below this point, the switch closes. Formerly the magnetic switches of this company were of the clapper type in the smaller sizes and of the contactor type in the larger ones, but in developing the new line the clapper type construction has been used throughout. On switches up to 100 amperes the arcing contacts also carry the current, but in the larger sizes, auxiliary arcing contacts are provided, the current being carried by laminated brush contacts. Among the advantages claimed for the clapper type construction are greater capacity for rupturing of the arc, longer life of contacts, more rapid operation, interchangeability of parts and easier access to parts requiring inspection and repairs.

A 14-in. x 6-ft. engine lathe with 12 spindle speeds secured by means of 13 gears, has been brought out by the Springfield Machine Tool Company, Springfield, Ohio. It is arranged for direct drive from the line-shaft to a single friction-clutch pulley or for a direct-connected motor drive. The headstock mechanism is entirely inclosed, and the gears run in an oil bath. The clutch pulley is located on the rear of the head and the clutch is operated by a push rod that allows the lathe to be started and stopped instantly, in addition to doing away with a countershaft.

Factors in Hardening Tool Steel*

Important Discussion of the Effect of the Time of Heating, the Speed of Quenching and the Mass

BY JOHN A. MATHEWS AND HOWARD J. STAGG, JR.

The phenomena of carburizing iron and of hardening it by quenching have been known for many centuries, yet the explanation of hardening steel has not yet been given to the satisfaction of all. Many theories have been advanced and each has its adherents, but one can scarcely say that any generally accepted theory or explanation exists. As recently as this year, two very interesting new theories were advanced at the May meeting of the Iron and Steel Institute of Great Britain.

In what follows we are not so much interested in the theories as in the practice of the art of hardening and tempering tool steel, and we shall confine our attentions to carbon steels, together with some consideration of so-called special steels containing various alloys, usually below 3 per cent. We shall not discuss high-speed steels, nor the many low-carbon alloy steels, primarily of value on account of their tensile qualities, but also, in many cases of limited value for tools, especially those used for hot work. We shall consider the subject, also, from the basis of sound well-worked materials and shall not consider the influence of defects, such as pipes, seams, bursts, laps, burning, etc. The hardening operation itself will give sufficient scope for our thought and attention.

Tool steels are included within the range of 0.60 to 1.50 per cent. carbon, but not less than 90 per cent. of them fall within carbon limits of 0.75 to 1.35 per cent. They are usually made by the very old crucible process or the very new electric processes, and just now there is considerable discussion as to the relative merits of these methods. As the writers are among the few men in the world who have had practical experience with both processes, we will refrain from discussing their respective merits at the present time to leave a free field for partisans. It is hardly necessary to remark that no mere process is a guarantee of quality; it takes brains, plus a process, to succeed in almost any line of manufacture. This is particularly true of tool steel, which is subjected to so many operations between the melting and the selling stage.

EXPANSION AND CONTRACTION WITH HEATING

Of great practical importance to the hardener are the volume changes, both expansion and contraction, which occur during the critical ranges of temperature. The permanent changes in dimensions which steel undergoes in hardening are of the utmost interest to the hardener, and associated with these changes is the problem of hardening cracks.

Le Chatelier has studied the phenomena of expansion or dilatation by accurate scientific methods and has divided the changes into three zones of temperature: (a) changes at temperatures below that at which allotropic transformation begins; (b) changes at temperatures above those at which allotropic transformation occurs; and (c) changes occurring within the critical range itself. During the first of these periods from 0 to 700 deg. C., iron and steel expand nearly equally, the amount of carbon exerting little influence. For any iron or steel, however, the amount or rate of dilatation increases with the temperature. Below 100 deg. C. the dilatation is about 0.000011 in., while between 600 and 700 deg. C. it increases to 0.0000165 in. per deg. C. Above the critical range, however, the coefficient of dilatation varies directly with the carbon and is nearly twice as great for a 1.20 carbon steel as for a 0.05 carbon iron. The changes taking place at AC_1 and AR_1, Le Chatelier has not been able to study so satisfactorily. He has found, however, that the dilatation, which increases directly with the temperature up to AC_1, suddenly stops and that instead of an expansion, a *marked contraction* takes place.

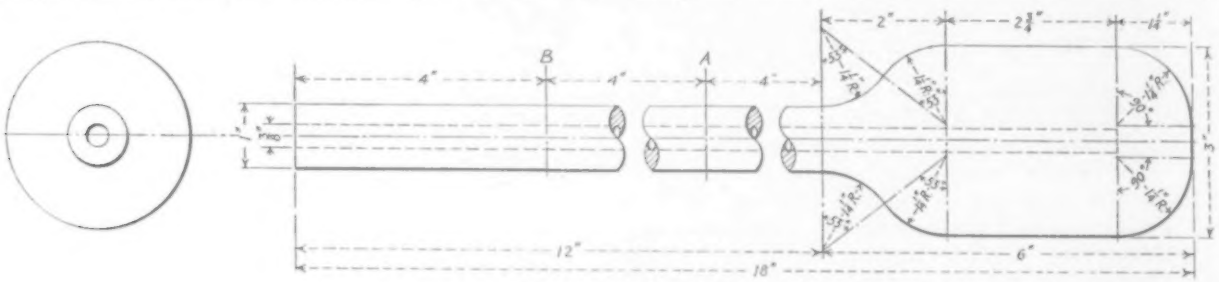


Fig. 1—Test Piece Used in Quenching Tests

On cooling steel from high temperatures, these changes in dimensions are reversed, although they are not quantitatively equal, nor do they occur at the same temperatures. It is an axiom that heat expands and that cold contracts; but with steel there is a certain critical temperature at which an abnormal behavior is noticed, namely, a sudden shrinkage on heating and an expansion on cooling. The expansion of steel in heating to 750 deg. C. is about ⅛ in. per foot, and when we recall that, in quenching, a corresponding contraction attempts to take place suddenly, it is little wonder that strains are set up that may exceed the ultimate strength of the steel.

What is the relation of the above to overheating, or heating above that temperature at which it is necessary to harden? After passing through the critical range, the expansion takes place at its maximum rate. When steel is heated in such a manner it assumes the shape corresponding to the maximum temperature and on cooling the whole piece tends to return to, or near, its original size. In so doing, the outer, or first cooled, portion is hardened first and forms a hard, brittle, unyielding

*From a paper presented at the annual meeting in New York of the American Society of Mechanical Engineers, December 1 to 4. Doctor Mathews is general manager of the Halcomb Steel Company, Syracuse, N. Y., and Mr. Stagg is associated with him.

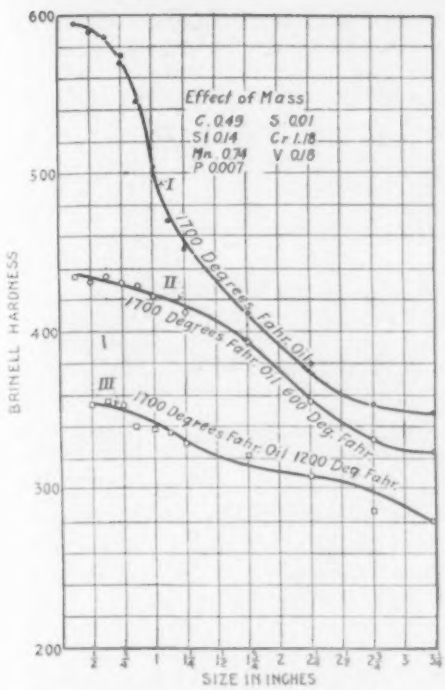


Fig. 2—Brinell Hardness on Test Pieces After Quenching

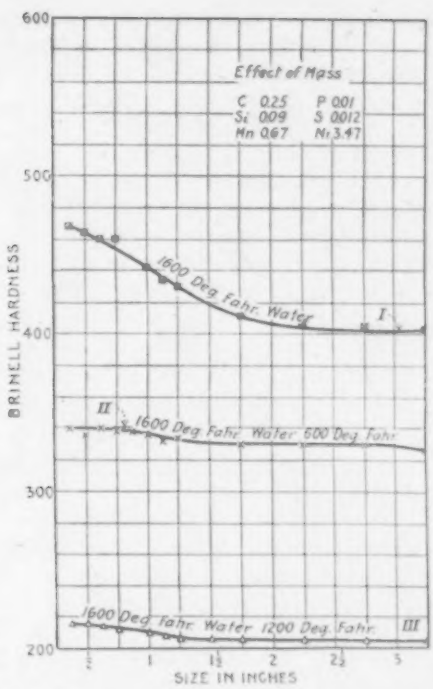


Fig. 4—Brinell Hardness on Test Pieces After Quenching

shell, and the strains set up by the slower cooling interior may either (a) fracture the shell, producing external cracks, especially if the shell be uneven in thickness; or (b) burst the piece at the center if the shell is of even thickness and strength. This latter occurrence is accompanied by a peculiar appearance of the fracture and frequently and wrongly called pipe.

TIME OF HEATING

Too much stress cannot be laid on the fact that there is a correct length of time for heating and that this time of heating is as important as the temperature to which heated. There are at least two dangers which must be avoided.

First, if the heating be too fast, a uniform temperature does not exist throughout the mass being heated. For example, a die block heated too quickly may exhibit the following conditions: The outer portions may be above AC_3, and expanding at the maximum rate; the intermediate portions may be in the transformation range and contracting; while the inner portion, which is below AC_1, is slowly expanding at the characteristic rate below AC_1. What wonder that steel fractures under such conditions?

Second, grain size depends among other variables under (a) temperature above AC_3, and (b) time above AC_1. If heating be of such a character that the piece is held above AC_3 for an abnormally long time, the crystals may have grown to such an extent that on quenching, abnormal grain size is retained and the result is a weak, if not cracked, piece.

Quick heating in a furnace which is considerably hotter than the correct hardening temperature is extremely bad practice. The difficulty is that the thin parts, corners and edges are liable to attain an overheated temperature before the larger portions of the piece attain the correct hardening tem-

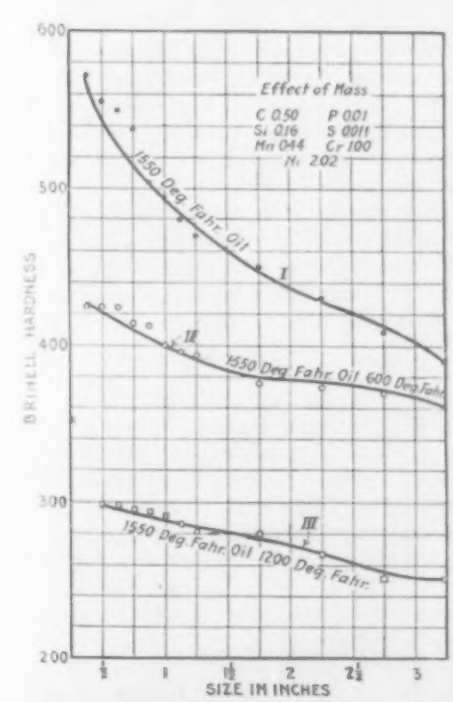


Fig. 3—Brinell Hardness on Test Pieces After Quenching

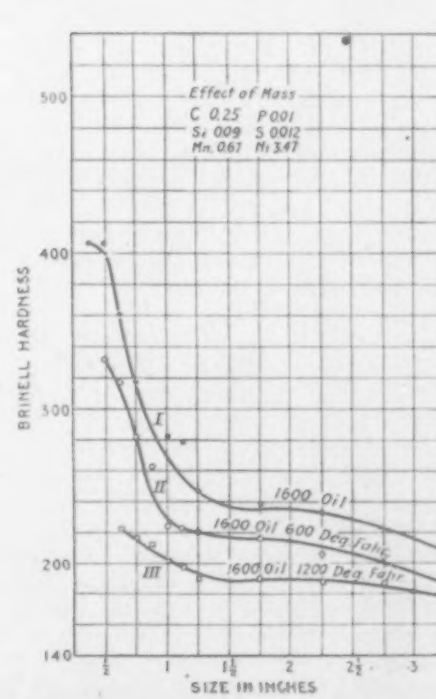


Fig. 5—Brinell Hardness on Test Pieces After Quenching

perature, and this overheating of the thin parts produces large grain size, abnormal expansion and tends to produce cracks.

SPEED OF QUENCHING

If a sample of steel be cooled slowly from above AC_1, the solid solution which has been formed breaks up and precipitates its cementite and ferrite and we have then an annealed steel. If the cooling, on the contrary, be rapid, the solid solution is not given the time necessary to permit the complete dissociation into cementite and pearlite, and we find formed the intermediate breakdown of austenite, known as martensite. If the cooling be intermediate in its speed between extremely slow and extremely fast, we find intermediate microconstituents, troos-

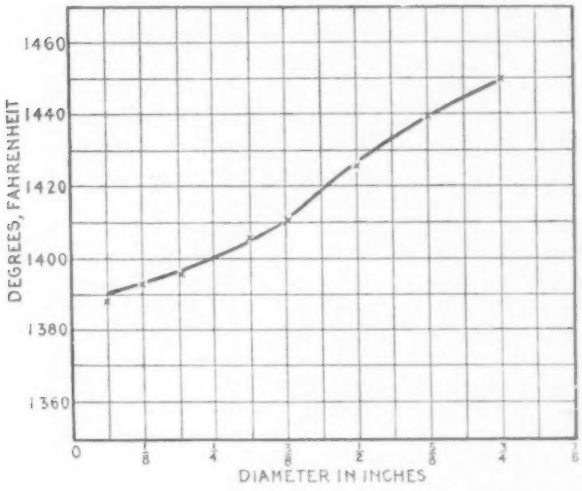


Fig. 6—Temperature-Size Curve for Hardening Tools

tite or sorbite. The correct constituent, however, in a hardened steel is martensite, and to form this martensite the material must be cooled quickly.

There are several degrees of "quickness" which at once suggest themselves. There is, however, a critical rate of cooling through the range which must be attained before the piece will be hardened. On quenching it is clear that the surfaces of the section are cooled and hardened first. If the mass being cooled is of considerable size, different degrees of hardness are noticed from the outside to the middle. This can be illustrated by the two examples in the table, which, however, are not tool steels. Bars of the analysis shown, 3¼ in. sq. x 18 in. long, were quenched from indicated temperatures. A transverse section ½ in. thick was sawed from the middle and Brinell hardness tests made at equidistant points on its surface. It will be noted that in each instance the corners, or thinnest portions, were the hardest. Next in hardness were the edges, and the decrease in hardness was quite uniform to the center of the bar.

The cooling medium used, its temperature and condition also affect the rate of cooling. Benedicks has investigated this subject and arrived at conclusions of extreme interest. He found that in order that a liquid present in large bulk may exhibit a good quenching power it is necessary: that it should possess a high latent heat of vaporization; that it be maintained at a temperature low enough to avoid too abundant formation of vapor. High specific heat, low viscosity and large heat conductivity all act, it is true, in the direction of quick cooling, but the influence of the two factors last mentioned appears to be of a different and lesser grade than the heat of vapor formation.

The authors have devoted considerable time to investigating numerous commercial media which are in use in typical hardening plants of the country at the present time. The results given are only

Table of Penetration of Hardness

	1	2	3	4	5	6	7	
1....	411	359	321	314	321	359	411	3¼ in. sq. by 18 in.;
2....	359	316	297	281	297	318	400	water, 1500 deg. F. ½
3....	337	283	283	280	283	295	340	in. transverse section
4....	330	283	280	280	280	283	335	from middle of length.
5....	337	278	283	280	285	298	340	C, 0.29; Si, 0.09; Mn,
6....	359	301	297	281	297	301	380	0.65; P, 0.01; S, 0.01;
7....	411	359	337	317	337	380	420	Ni, 3.47.

	1	2	3	4	5	6	7	
1....	359	353	337	317	337	353	359	3¼ in. sq. by 18 in.; oil,
2....	350	335	325	320	323	327	350	1675 deg. F. ½ in.
3....	328	330	320	320	320	327	328	transverse section from
4....	325	320	316	314	316	320	325	middle of length. C,
5....	328	325	320	317	320	325	328	0.49; Si, 0.14; Mn, 0.74;
6....	350	327	323	319	323	327	359	P, 0.015; S, 0.014; Cr,
7....	359	350	328	325	328	359	362	1.18; V, 0.17.

a small portion of those actually obtained, but they are typical.

In attacking the problem, the following method was adopted: A test piece of the dimensions shown in Fig. 1 was machined from a solid bar, and a hole drilled through the neck to within an equal distance from each side and bottom of the test piece. Into this hole a calibrated, platinum-rhodium couple was inserted and the leads connected to a calibrated galvanometer. The test piece was then immersed in a lead pot, also containing a thermo-couple to the point A, and the lead pot was maintained at a temperature of 1200 deg. F. When the couple inside the test piece was at 1200 deg. F., and the couple in the lead pot read 1200 deg F., the test piece was removed and quenched to the point B in 25 gal. of the quenching medium under consideration. At the start the quenching medium was maintained at room temperature. The time in seconds that it took the test piece to fall from a temperature of 1200 deg. F. to a temperature of 700 deg. F. was noted by the aid of a stop-watch. It is clear that immersing the test piece in the quenching medium raised the temperature of the medium. The test piece was then replaced in the lead, heated to 1200 deg. F., quenched into the medium at this higher temperature and the time again taken with the stop-watch. These operations were continued until the quenching media, in the case of oils, had attained a temperature of about 250 deg F.

A consideration of the results is interesting. Pure water has a fairly constant quenching rate up to a temperature of 100 deg. F., where it begins to fall off. At 125 deg. F. the slope is very marked. Brine solutions have both a quicker rate of cooling and are more effective at higher temperatures than water. The curve does not begin to fall off seriously until a temperature in the neighborhood of 150 deg. F. is reached. Where water at 70 deg. F. cooled the test piece in 60 sec., the brine solutions cooled it in 55 sec. As is well known the oils are slower in their quenching powers than water or brine solutions, but the majority of them have a much more constant rate of cooling at higher temperatures than water or brine.

HARDNESS AS AFFECTED BY MASS

It has been known for some time that different masses of the same material on being quenched under like conditions gave varying physical properties, but it is only within recent years that the quantitative effect has been measured. The authors give below a few results which, although obtained several years ago, are printed for the first time.

Test pieces 4 in. long were made from the same ingot in sizes increasing ⅛ in. in both breadth and thickness. The smallest was ⅜ in. square and the largest 3¼ in. square. Three ingots of different type analyses were chosen and a series of test pieces

made from each. The test pieces were heated in a semi-muffle furnace to a constant temperature for each type of material, quenched, and the Brinell hardness test made. Each series was then drawn to 600 deg. F. in a salt bath and Brinell tests again taken and then reheated to 1200 deg. F. in a salt bath and Brinell hardness tests again run. The results are graphically shown, Brinell hardness plotted against test piece size in Figs. 2 to 5, inclusive.

It will be noted that the smaller the sample the greater the figure of hardness, indicating that the smaller sections are cooled with greater rapidity than the larger, and hence more hardness is developed. The same agencies are at work in tool steel. The larger the mass the smaller the depth of hardness when quenched under similar conditions. Benedicks has shown that for steel of constant mass, the higher the temperature, the greater the rate of cooling. Two of his results will be sufficient to cite:

Weight of specimen in grams	Deg. C. quenching temperature	Cooling time, seconds
12.3	845	4.43
12.3	703	5.73

These results confirm our experience that in order to produce the same amount of hardness in a small and large section it is necessary to heat the larger section hotter than the smaller. A commercial application of this phenomenon will perhaps be interesting. The authors were recently confronted with the problem of finding out the correct temperature for hardening tools made from the same steel in sizes varying from 1/16 in. diameter to ¾ in. diameter. The temperature-size curve shown was finally adopted (Fig. 6). In other words, a 3/16-in. round will harden at 1395 deg. F., while a ¾-in. round bar should be heated to 1450 deg. F.—a difference of 55 deg F.

TIME AND DEGREE OF DRAWING TEMPER

After the hardening operation has been safely performed, the next important step is that of drawing the temper. This operation is necessary for two important reasons: The relieving of abnormal strains set up due to the quick contraction or expansion; the breaking down of the extremely hard and brittle structure of the quenched steel. The authors have seen expensive tools such as broaches, dies, etc., actually burst and fly apart due to the fact that the strains set up in hardening were not relieved by drawing the temper soon enough after the hardening operation. If this paper can impress upon its readers the absolute importance and necessity of drawing the temper *immediately* after hardening, the authors feet it will not have been in vain.

In a properly quenched and hardened steel the hardening carbon, that up to 0.90 carbon, exists in the form of carbide of iron, Fe_3C, dissolved in iron, and the solution is known as martensite. If the steel is hyper-eutectoid, i.e., higher than 0.90 carbon, all that up to 0.90 is dissolved and the remainder exists as globules of undissolved cementite scattered throughout the matrix. The drawing of the temper begins to break down the true martensitic structure and as the temperature increases there are formed intermediate micro-structures between martensite and pearlite, first troostite, then sorbite, and finally pearlite. Professor Heyn has published some valuable results on the decrease of hardness on tempering. The results are expressed in per cent. of the original hardness:

100 deg. C.....	2.5 per cent.	400 deg. C.....	70.0 per cent.
200 deg. C.....	14.0 per cent.	500 deg. C.....	87.5 per cent.
300 deg. C.....	41.0 per cent.	600 deg. C.....	97.5 per cent.

Regarding the effect of time on drawing the temper we submit the following: Standard ½ in. round A.S.T.M. test pieces were quenched from constant temperature into the same medium, and the temper drawn in the same salt bath at constant temperature for five minutes, fifteen minutes, etc.:

Elastic limit	Maximum strength	Elongation	Reduction	Brinell	Remarks
228,750	260,137	2.5	....	425	1550-oil-800 deg. F. 8 min.
201,125	214,562	11.6	45.4	390	1550-oil-800 deg. F. 20 min.
175,000	183,187	12	49.35	340	1550-oil-800 deg. F. 40 min.

Each of these results is the average of four closely agreeing checks. A study of the above table shows that time at the drawing temperature has a marked effect. The act of breaking down the martensite is progressive and not sharply defined. Both time and temperature have their effects.

The greater the initial hardness of the piece, the more marked is the effect of drawing the temper. By referring to Figs. 2 to 5, inclusive, the actual values in Brinell hardness are shown. The piece of 0.25 carbon nickel, ⅝ in. sq., quenched in oil, shows a Brinell of 360; drawn to 1200, a Brinell of 223. The per cent. decrease in hardness is 61. The piece 3¼ in. sq., quenched, shows a Brinell of 208; drawn to 1200 deg F., Brinell 183, showing a decrease in hardness of only 13 per cent.

CHANGES IN SIZE AND SHAPE

Thallner states that two kinds of strains are present in hardened steel: (a) those which occur in steel of small cross section which hardens throughout; (b) those which occur in steel of larger cross-section due to unequal change in volume of the surface and interior. The first of these also occurs in steel of larger cross-section, but to the greatest degree on the surface. Thallner also classifies steels as (a) those which become shorter and (b) those which become longer or shorter in hardening. The two classes are not sharply divided. In pure carbon steels, the line of demarcation is about 0.90 carbon. In steels which lengthen, an increase in both length and width may also occasionally be observed and the larger cooling surfaces usually become convex. Thallner cites five crucible steels which he examined as shortening and eight basic open-hearth steels as lengthening.

The tendency of steel is to become spherical by repeated quenchings. Law, working with a square piece of tool steel 3½ in. x ½ in. x ½ in., quenched it 550 times and at the end of this work the piece was nearly round in cross-section. The ratio of length to diameter had changed from 3½:½ to less than 2:1. An equally interesting observation by Mr. Law was that the steel did not lose carbon or change in any way in composition.

Many years ago, one of the authors made several hundred hardening experiments and several thousand measurements to study the change of shape. The materials used were cylinders of steel and taps. Crucible steel alone was examined and the following variables were considered: (a) the effect of original form or diameter upon the diameter after hardening; (b) the influence of carbon on change of form; (c) the influence of initial temperatures at quenching; (d) the influence of length of time of heating; (e) the influence of repeated hardenings, and (f) the effect of annealing previously hardened steels, upon change of shape in rehardening. Obviously when plain cylinders of steel are considered there are four possible changes of shape possible, expansion in length and diameter, contraction in length and diameter, expansion in length and contraction in diameter, and contraction in length with expansion in diameter.

Under the influence of the variable conditions mentioned above, all four changes were actually produced. Steel was also found which expanded in length on first hardening and contracted indefinitely thereafter on repeated hardenings. Another steel expanded in length on two hardenings and contracted on the next two. In a variable carbon series of steels from 0.50 to 1.32 per cent. carbon, the magnitude of the change in length after four hardenings increased as the carbon increased. For the same series it was noted that the volume changes were greater when hardening annealed rather than unannealed bars. The increase in length is greater the higher the hardening heat for all carbons. The details of this work would take us too far from the purpose of our paper. The point we wish to emphasize strongly is that it is variable conditions that give variable results. Hence, it is of vital importance that steel be furnished uniform, chemically as well as physically, and it is equally important that the user employ every possible refinement in the handling of his product. It is only under varying conditions of heat, size, time, composition, etc., that the results vary. Constant conditions give constant results.

It cannot be overlooked, however, that constant conditions are not always attainable. The maker of steel cannot control conditions in his customer's shop and the customer cannot control conditions in the steel plant, and the human element must be considered in both.

FURNACES AND METHODS OF HEATING

Much has been said regarding the superiority of gas furnaces over oil furnaces and vice versa. The fuel used is immaterial for good practice so long as the following points are taken care of: The furnace and hearth should be of sufficient size so as not to be affected materially in temperature by the introduction of the parts to be hardened. The furnace should heat at a uniform rate. The furnace should be of uniform temperature over its entire hearth. The furnace should be run under neutral, or reducing, conditions. A good rough test for this is the introduction of a piece of wood or paper upon the hearth. If the paper or wood burn, the atmosphere is oxidizing. If they char, reducing or neutral. The temperature control must be at all times exact and it must be possible of exact duplication on repetition work.

A blacksmith's fire is satisfactory under good handling, but the difficulty is the fact that for constant work it is too exacting on the operator and requires too many manipulations to secure uniform and continuous results.

CONCLUSIONS

We have endeavored to enumerate the factors which enter into the every-day operation of hardening tool steel. It is the duty of the user of steel to study these influences and through study and experience to properly weigh the many problems presented in what is frequently considered a simple operation. The various factors are not always of equal importance and must be considered in connection with the size and nature of the object being hardened and the duties expected of it after hardening. To expect uniformly good and consistent results from a hardener whom you have not provided with adequate or suitable equipment is unreasonable. When the question of good equipment in the way of furnace, quenching arrangements and media, pyrometers, etc., has been satisfactorily taken care of, your hardener still has plenty of variables to contend with which are beyond his control. We hope we have made clear what some of the variables are and have excited some interest and desire upon the part of those responsible for hardening results to study them as they have not studied them before. The hardener's task is a difficult one, and if we have presented herein any suggestions of value our efforts will not have been in vain.

The Discussion

The discussion was opened with a contribution in writing from Dr. Henry M. Howe. He regarded the paper as a very important contribution to the knowledge on hardening tool steel. The care and accuracy obvious, he felt, gave the results great value. He commended the methods which did not require intricate apparatus. He expressed an interest to know the composition of the steel which, as mentioned by the authors, would neither expand nor contract when subjected to quenching. In referring to the relative hardness of corners of a piece, he said the hardness is really greater than indicated, as there is less resistance to the penetration or metal displacement by the ball of the testing machine at the corners than at other places.

J. J. Ralph, Jamaica, N. Y., described some experiences in attempting to heat treat 2-in. diameter pieces so that quantity production could be maintained with the pieces kept within a 0.002 in. above or below desired size, without entailing finishing expense after hardening has been completed. The experiment pointed to there being some best quenching temperature, at which there would be neither expansion nor contraction. Finally he found it possible to have 90 per cent. of the product coming through the hardening process remaining to size. He mentioned one case also in which a steel of 0.60 per cent. carbon was treated with a temperature control claimed to be within 5 deg. F., or less than the instrumental error of the indicating pyrometer. In this case, the bath type of furnace was used with resistance thermometers, and the treatment is held as a secret.

Steel, when hot, he continued, seems to bend like lead, and with slender pieces there is a high degree of distortion. In one case a square section was substituted for a round where the distortion amounted to a twist. It was a matter of great importance, he said, if there is a practical way to hold hardened pieces to shape, as then machining could be done when they are soft and materials could be used of the physical properties desired. He ventured that the introduction this past year of the potentiometer pyrometer would prove a great help.

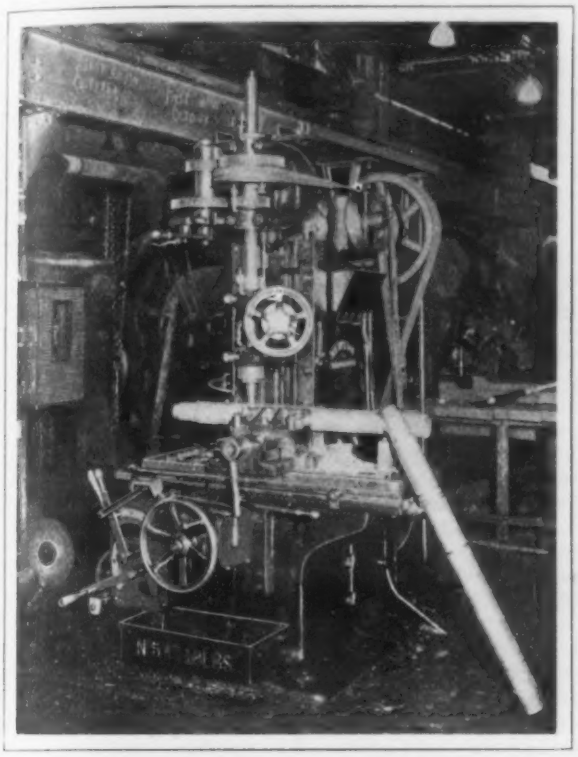
Arthur D. Jackson, general superintendent of the Miller Lock Company, Philadelphia, felt that the time factor was important and that a rule was greatly desired which would recognize the shape and size of the piece, so that not only mass is considered but superficial area.

C. R. Cary, of the Leeds & Northrup Company, Philadelphia, explained some experiments with 5 x 3 x 1-in. die blocks which were treated in an electric resistance furnace with a couple in contact with the die and one exposed to the furnace air. He intimated that by the observation of the temperatures obtained from the two thermocouples, it was possible to ascertain when the piece under treatment had been brought to the proper state, and also indicated that the variation in time duration of heating must be controlled. The type of furnace and a lack of uniformity of time in heating were factors.

The Linde Air Products Company, for the convenience of users of oxygen in the Northwest, has opened a new warehouse at Portland, Oregon, 104 North Fifth street.

Vertical-Spindle Keyseating Machine

The Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa., has developed a keyseating milling machine of the single vertical-spindle type. Although this method of cutting keyseats has been used abroad for some time, this is said to be the first instance in which it has been employed in the United States. Better bearings for the keys are secured, it is claimed, and the necessity of providing the clearance for the cutters by using a separate machine is done away with. It is pointed out that the machine is particularly valuable where very short seats have to be milled.



A Vertical-Spindle Machine for Cutting Keyseats in Shafts in Use at a Large Electrical Manufacturing Plant

The machine uses end cutters which are sunk to the proper keyseat depth in the solid shaft without any previous drilling or chipping of clearance, and the table feed which varies from 0.008 to 10.09 in. is then thrown in. The full length, depth and width of the keyseat is machined in one operation, and as the cutter is sunk the full depth before starting the long cut, it may be made slightly larger on the bottom to cut away a small portion of the sides. This, it is emphasized, secures a key that fits properly on the sides and eliminates the time formerly employed in fitting keys where the seats were made by a cylindrical cutter. On keyseats ranging from ¼ to ⅝ in. in width, feeds of approximately 1 in. are used, and on 1-in. keyseats the feed is decreased to ¾ in. per min., with ordinary cutters, although, of course, these rates could be increased if high-speed cutters were employed.

The machines are belt driven either directly or through back gears. The spindle saddle is counterweighted and has hand vertical adjustment with a micrometer depth gauge. The dial table feeds are by belt with gear changes, and the table has automatic feed release and hand adjustment.

The machine illustrated is in use at the plant of the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., where three other machines are also installed. The time required for setting the cutter and sinking it is between ¼ and ½ min., and in ordinary practice 1-in. keyseats 4 in. long are completely finished in approximately 7½ min.

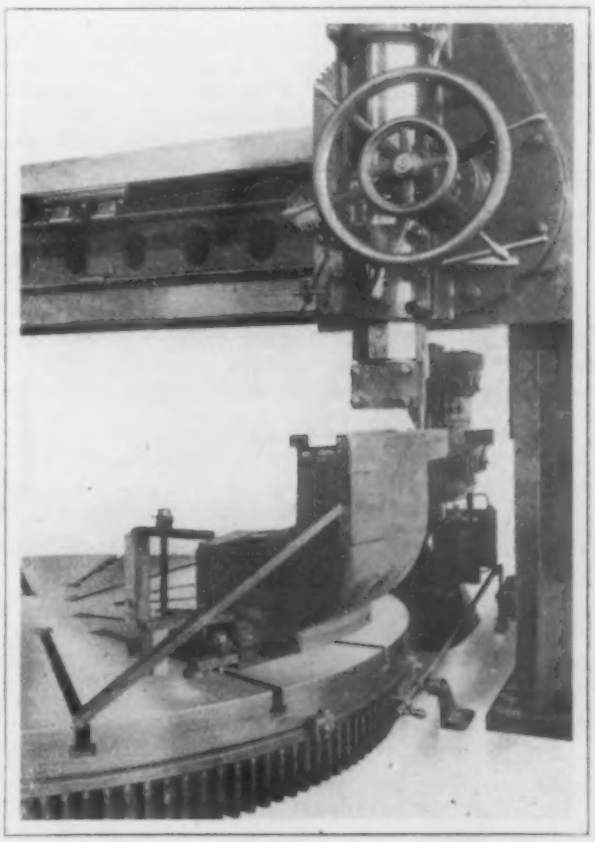
The following table gives the principal dimensions and specifications of the machine:

Diameter of the spindle through the driving sleeve, in.	2½
Morse taper of spindle	No. 4
Minimum distance between spindle end and table, in.	6
Maximum distance between spindle end and table, in.	18
Distance between spindle center and upright, in.	9⅜
Dimensions of the work table, in.	11 x 40½

Reversing Motor Drive for Boring Mills

Where an arc or a segment has to be machined, the work is performed on a boring mill. A piece requiring only a 12-in. stroke is frequently put upon a 72-in. machine, with the result that for five-sixths of the time the mill is merely revolving and the loss of time for each cut is, of course, considerable. As an example of this may be mentioned the finishing of locomotive driving wheels where the center weight sometimes projects beyond the boss of the axle and the crank pin. This boss is finished on a boring mill and the work requires only a short cut. With a view to overcoming this trouble a reversible drive for a boring and turning mill has been placed on the market by the Electric Controller & Mfg. Company, Cleveland, Ohio.

In the accompanying engraving the drive is shown applied to a large boring mill at the Gleason Works, Rochester, N. Y. This machine is fitted with a selective reversing or non-reversing controller and is planing a T-slot in a piece having an angle of 120 deg. The reversing switch is operated by dogs which are attached to the table and reverse the motor, the principle involved being the same as that of the reversing drive for a planing machine. In starting and stopping the controller a push button



A Reversing Motor Drive for Boring and Turning Mills Which Enables the Table To Be Returned to the Starting Point When Short Pieces Are Being Handled Without Making a Complete Revolution

is mounted on the housing of the machine within easy reach of the operator, although when the tool is cutting at 180 deg. or more, the control employed is of the non-reversing type.

After the starting button has been pressed, the motor is brought up to speed in either direction by four automatic acceleration steps. To enable the return stroke to be made at a greater speed than the forward cutting one, a variable-speed motor is used, and dynamic braking is employed to stop the motor quickly.

AMERICAN EXPORT TRADE

Work of the Bureau of Foreign and Domestic Commerce in Extending It

WASHINGTON, D. C., December 8, 1914.—An illuminating summary of the work the Bureau of Foreign and Domestic Commerce is doing in aid of our export trade is contained in the forthcoming annual report of Secretary of Commerce Redfield. For the first time since the creation of the Department of Commerce the Government has an organization adequate for its purposes. It works abroad through a three-fold force: the commercial attaches, the consular service and the commercial agents. Since Congress provided an appropriation of $100,000 for commercial attaches nine of these officers have been appointed and commissioned with salaries ranging from $4000 to $5000 per annum, as follows: A. H. Baldwin, at London, England; Erwin W. Thompson, at Berlin, Germany; C. W. A. Veditz, at Paris, France; Henry D. Baker, at Petrograd, Russia; Albert Hale, at Buenos Aires, Argentina; Julean H. Arnold, at Peking, China; Lincoln Hutchinson, at Rio de Janeiro, Brazil; A. I. Harrington, at Lima, Peru; and V. L. Havens, at Santiago, Chile.

It is the effort of the Department of Commerce to supplement the intelligent activity of our consuls with an equally intelligent use of the mass of valuable material which their labors place at the department's disposal. The commercial agent is the traveling man of the department. He takes a single subject or a group of subjects and goes from country to country in his study of them, submitting reports upon the one general theme from the point of view of many nations and of diverse markets. The force thus briefly described, Secretary Redfield says, may also be characterized: The permanent officer with the general outlook—the attache; the permanent officer with the local outlook—the consul; the traveling officer with a single subject—the commercial agent. It is not meant in any way to exclude the important work of the consuls general, but rather to co-operate with them in hearty appreciation of the important services they render. The force in the foreign field is instructed that its members are not rivals of our other national officers there, but helpers.

COMMERCIAL AGENTS AND SPECIAL INVESTIGATORS

In the month of October, 1914, there were in service, or about to start to their respective fields, the following commercial agents:

H. N. Douthitt, electrical and general machinery supplies, South America.

Charles Ferguson, commercial investigations in the United States.

William A. Reid, special services in developing export trade, United States.

F. H. Smith, markets for lumber in the Orient.

S. S. Brill, markets for hardware in South America.

L. L. Bucklew, furniture trade in South America.

Garrard Harris, general commercial studies in Latin-American countries.

Benjamin Joachim, clothing trade in Latin-American countries

Roger E. Simmons, lumber industry in South America.

Ralph M. Odell, cotton textiles investigation in the Orient.

J. A. Massel, general machinery, including machine tools, in South America.

L. B. Hoit, general trade conditions in Mexico.

During the fiscal year commercial agents were engaged on investigations as follows:

E. N. Hurley, banking and credits in South America.

J. Alexis Shriver, canned goods in foreign countries.

Frank G. Bolles, coke-oven by-products and electric furnaces.

A. J. Wolfe, commercial laws in foreign countries.

W. A. Graham Clark, cotton textiles in Japan and Manchuria.

Ralph M. Odell, cotton textile trade and industry in China, India and Australasia.

Henry D. Baker, commercial conditions in India.

E. W. Thompson, oil-seed products investigation.

E. A. Thayer, proprietary medicines, drugs, and canned goods.

D. C. Alexander, machinery trade in the Far East.

F. J. Sheridan, Grosvenor M. Jones, C. D. Snow and C. W. A. Veditz, pottery investigation (cost of production).

The provision by Congress of a special fund for promoting commerce in Latin America, in addition to the general fund for promoting commerce, has also permitted another marked forward step in the organization of the bureau for efficient work. An experimental office was opened in New York to see whether a closer touch could thus be had with the business world and whether the new service would be used and appreciated. The success of that office led to the opening of others in Chicago, San Francisco, New Orleans, Boston, Atlanta and Seattle. The eighth office has only recently been established in St. Louis. To these offices are sent the consuls who come from abroad. The commercial attaches go thither before leaving for their posts or upon their return. The commercial agents make them their headquarters for bringing their work into touch with the local business community. Thus contact is had with the business community personally and hourly.

One step further was taken this month. A traveling representative of the bureau has been put in the domestic field who will go from city to city conferring with merchants and manufacturers, informing them of the work of the bureau, learning how its services to American commerce can be improved, instructing them how to avail themselves of it, and thus representing directly and personally the bureau in its effort to extend our commercial prosperity.

The services thus rendered to commerce, Secretary Redfield says, are of a directly practical nature. Actual orders have been obtained through the bureau's action in making foreign conditions known to the domestic producer. It is regretted that a recent law hampers this useful service by forbidding the attendance of Federal employees at trade conventions except at their own expense. It surely was not the intention that the law should prohibit the commercial representatives of the country from making known directly to business organizations the information which they have traveled far and labored hard to get, and it is understood that an effort will soon be made to have this restriction removed. W. L. C.

Duty on Parts of Turret Lathe

The Board of General Appraisers has decided that parts of a No. 2 hexagon turret lathe are not dutiable with the lathes as "machine tools" as that term is used in the tariff act of 1913. The parts were returned for duty at 20 per cent. under paragraph 167, as "manufactures of metal." G. W. Sheldon & Co., the importers, contended that, as the lathes were admitted at 15 per cent. as machine tools, the parts should be accorded the same treatment. In finding against the protestants, Judge Fischer says that there is nothing in the record as submitted which would indicate that the disputed machine parts are other than additional attachments or extra parts which may be used in connection with the lathes. The board holds the articles were properly classified by the collector at New York.

The Society for Electrical Development, Inc., 29 West Thirty-ninth street, New York City, has issued a booklet entitled "Household Electricity." It contains a brief illustrated description of the various devices suitable for use in a modern residence and suggestions to aid in the selection and method of installation. It has been published in two forms, one for the electrical contractor and one for the householder.

MECHANICAL ENGINEERS MEET

Some of the Subjects Discussed Last Week in New York

The annual meeting of the American Society of Mechanical Engineers, held in New York City last week, was the medium of bringing into public notice the mechanical process of improving rail manufacture recently introduced at the Lackawanna Steel Works. A notable contribution was also made on the problems of hardening tool steel. An authoritative presentation of grinding wheel operation as applied to the machine shop was another feature. Conspicuous for the interest aroused and the extended nature of the deliberations was the movement looking to standardizing steam boiler design, construction and inspection. Industrial management received attention in a paper arguing on what constitutes a proper basis for ascertaining betterment in production, or measuring the works' efficiency, and was touched on by the address of retiring President James Hartness in his references to the human element in manufacturing and by a paper covering what one large company has done to establish various manufacturing and purchasing standards in its own organization. Some practical points on factory buildings, including factory floors, were brought out.

The meeting was the largest yet held, in point not alone of the total registration, exceeding 1300, but in the average attendance at the sessions. Spectacular in this regard were sessions given over wholly to the subject of the engineer in public service, having reference in the main to the mechanical engineer in municipal employ. The sessions were held in the Engineering Societies Building, December 1, 2, 3 and 4. Tuesday evening marked the opening, with the presidential address by Mr. Hartness and the introduction of the new president, Dr. John A. Brashear, astronomical instrument manufacturer, Pittsburgh, followed by a reception in the Society's rooms as usual. Parts of President Hartness's address were printed in the last issue.

THE STEAM BOILER CODE

The business session was held on Wednesday morning. It was voted that the form of publications of the society be made the subject of a referendum and the council was directed to prepare for a letter ballot. Most of the time was given up to the report of the committee on standardizing steam boiler design and construction. Among other objects aimed at is the preparation of a code suitable for forming the basis of legislation in the various states so that there may be that degree of uniformity over the country that a boiler made in one state will be acceptable in another. The work is one of the notable activities of the society. The meeting received a preliminary report which is actually its fourth printing. While the committee was appointed about 3½ years ago and has had many sessions and devoted much time to the subject, it did not come prominently before the society until the last summer meeting at St. Paul. Following this, hearings and conferences have been held and, most important of all, the committee has been instrumental in bringing numbers of manufacturers together to a harmonious agreement among themselves, a condition which heretofore has seemed impossible. For example, manufacturers of safety valves submitted jointly to the committee views regarding what should be the code and standardization requirements regarding their product, and manufacturers of both lap-welded and seamless boiler tubes have drawn up a standard specification which marks a long step forward. All this had been done before the meeting and it is safe to say the committee was not prepared for the avalanche of criticism, constructive and otherwise, which poured in at the meeting and which required session after session throughout the meeting. Great expectations there are of the influence for good which the final report will exert, and the care and thoroughness with which it is being handled are calculated to help give it the weight which those especially well informed expect it to have in shaping legislation and otherwise proving useful.

THE PROFESSIONAL SESSIONS

Two sessions were held Wednesday afternoon. One was devoted to railroad mechanical engineering problems. At the other among others were presented H. L. Gantt's paper on "Measuring Efficiency," printed at some length in the last issue; C. B. Auel's paper on "Standardization in the Factory," also reviewed with illustrations last week, and a paper by George I. Alden, president of the Norton Company and the Norton Grinding Company, Worcester, on the "Operation of Grinding Wheels in Machine Grinding," a review of which does not find space in this issue.

Besides sessions both morning and afternoon on Thursday devoted to public service questions, one of the other simultaneous sessions of Thursday afternoon was given up in part to a paper under the joint authorship of Dr. John A. Mathews, general manager of the Halcomb Steel Company, and Howard J. Stagg, Jr., on tool steel hardening, reviewed elsewhere in this issue, together with the discussion; to a paper by Capt. Robert W. Hunt, of Robert W. Hunt & Co., Chicago, describing the method of removing defects on the surfaces of ingots by milling off the surfaces of partly formed rolled material, such as rails, this paper also reproduced in this issue, and to a paper by F. K. Vial, chief engineer of the Griffen Wheel Company, Chicago, on the standardization of chilled iron crane wheels.

The concluding professional session on Friday morning was devoted to power plant topics. The first paper on "A Rate-Flow Meter," by H. C. Hayes, professor of physics, Swarthmore College, dealt with a design of meter for measuring velocity of flow, consisting of a cylindrical chamber terminating in a cone at one end and the other end capped. The fluid enters through a tangential inlet, thus giving a vortical motion to the contents of the chamber, and leaves through the axial outlet into which the cone terminates. The meter is said to be more sensitive than the venturi and pitot forms and can be applied to the measurement of low rates of flow.

A laboratory for investigating and testing liquid flow meters of large capacity was described by W. S. Giele, Harrison Safety Boiler Works. The third paper, "A New Volume Regulator for Air Compressors," was presented by Ragnar Wikander, Hall Steam Pump Company. There were three other papers, one of which on "The Clinkering of Coal," by Lionel S. Marks, professor of mechanical engineering, Harvard University, suggested that specifications should include the melting temperature of the ash, as indicating the clinkering characteristics of the coal. The only method available for measuring both melting temperature and viscosity is the Seger cone method or some modification of it.

OTHER FEATURES OF THE MEETING

On Wednesday evening the John Fritz Medal for notable scientific or industrial achievement was conferred upon Prof. John Edson Sweet, Straight Line Engine Company, Syracuse, N. Y., for his achievements in machine design and pioneer work in applying sound engineering principles to the construction and developing of the high-speed steam engine. Gano Dunn, president of the Board of Award, presided. Dr. James Douglas, past-president of the American Institute of Mining Engineers, delivered an address on "Engineering in the Development of Mining." Dr. Samuel W. Stratton, director of the National Bureau of Standards also spoke on the relation of standards to the development of engineering. John R. Freeman, Providence, R. I., spoke on the significance of the medal.

The public service sessions were opened by John Purroy Mitchel, Mayor of New York City, and he was followed by happy extemporaneous addresses by Andrew Carnegie and the new president, Dr. John A. Brashear. All of the papers were discussed at considerable length, and in a spirited way, although practically everything that was said was either in favor of the engineer entering into the public life of the city to a greater extent than he has done up to the present time.

Causes of Coke Troubles in the Foundry

Several Problems of the Manufacturers Discussed Before Newark Foundrymen—By-Product Coke in the East

The manufacture of coke and its various characteristics, with special reference to its use in the foundry cupola, were discussed from many angles at a monthly meeting of the Newark Foundrymens' Association, Newark, N. J., December 2. Beehive coke was treated in a paper by W. G. Ireland, sales manager of the Jamison Coal & Coke Company, Greensburg, Pa., while the by-product process and coke were described in addresses by C. M. Schwerin, president of the Vinton Colliery Company, who formerly was connected with a by-product plant at Milwaukee, Wis., and by D. A. Barkley, chief chemist of the Lehigh Coke Company, South Bethlehem, Pa. In part, Mr. Ireland said:

I feel sure many of you have had occasion to criticize coke you have received and no doubt your criticisms were sometimes justified. Weather conditions—wind and rain—have a great effect on coke oven operation, and in the second place we have the human element to contend with which, as you know, is unreliable, particularly when one has to depend on foreign labor. The coke drawers usually start in quenching and drawing the coke about 1 a. m., and while we endeavor to provide a sufficient number of superintendents to keep a close check on them, they very often under cover of darkness load material which should not be loaded because it is not up to standard. It takes about 500 gal. of water to quench an oven of coke and the question of water supply has always been a very serious one with the coke producers in the Connellsville district.

COMPLAINTS SOMETIMES NOT WELL FOUNDED

Another factor in considering criticisms of foundry coke is its improper use. One foundry, in particular, which had been using our coke for many months made a strenuous complaint, stating that the last car of coke we shipped would not melt the iron, but that it all went to slag. Slag foamed up in the cupola until it came out the charging doors. We found they were using a 36-in. cupola and driving it with a No. 8 Sturtevant fan, large enough to run a 56-in. or 60-in. cupola. When the cupola was charged and the blast put on we found the pressure to be 16 oz. The heat went along quite satisfactorily for some time, but as the charges went down the resistance became much less, of course, and the blast pressure went down. The foundry foreman did not take into consideration that while the blast pressure was less than when he started, the volume of air going into the cupola was several times as great. In this case the introduction of an excess of air toward the end of the heat resulted in oxidizing a large percentage of iron, which went into slag, and as most foundrymen know iron containing even a small percentage of oxides is not very satisfactory for castings. Such iron has a higher melting point and will chill quickly, causing mis-runs.

After having the foreman close the slide in the windpipe so that the volume of air was reduced, he not only had success but was ready to stand back of our coke. They had had this same difficulty with every other brand of coke they had tried, without determining the real cause.

Another case of the abuse of coke was that of a large foundry located near Pittsburgh. They claimed they could not use a certain brand of coke. It was found the cupola man had blocked up the tuyeres on either side of the slag hole, as he said that when these were open the cutting of the lining around the slag hole was so severe he could not run a full heat. After having the cupola lined up in the proper manner and the tuyeres opened up so that air was admitted uniformly, it was demonstrated not only that they could use the coke they had condemned but that they required three tons per day less than they had been using.

MEASURING BY BULK VERSUS WEIGHT

Some time ago one of our friends in the New England States wrote us they positively could not use the coke we had shipped. The foundry foreman said the coke would not melt the iron and that at night the agglomeration in the cupola was so great that the bottom could not be dropped. It appeared to me the better plan would be to ascertain just what this foundryman was doing, and after one day's heat, which was on another brand of coke, it was discovered they were putting on the last three charges one ton of shot obtained by their water mill. It was recommended that they use our coke throughout the entire heat the following day and eliminate this shot. To the firm's surprise, they not only had an excellent melt but when the bottom was dropped in the evening there was not 2 in. of slag around the inside of the cupola. It was a clean drop.

Some years ago my company placed a large order for engines and boilers with a concern we had solicited on coke business for a great while but without success. In a spirit of reciprocity they decided to send us an order for ten cars of foundry coke. The first day this coke was used, instead of getting through at 5 p. m. they did not drop bottom until after 7 p. m. Their foundry losses were enormous, and what few good castings they did get they were unable to machine on account of their being so hard. Without any investigation they asserted the coke was extremely high in ash and sulphur, basing their opinion on the slow melting and the hard castings obtained. You can imagine what this concern said to us about the quality of our coke. At the time we were shipping approximately 25,000 tons of foundry coke to foundrymen from Nova Scotia to California, without any complaint except a casual one, which no doubt every coke producer will have as long as he is in business. The manufacture of coke is not an exact science. On investigating this complaint we found they had been using a coke made from Freeport coal, which runs about 25 per cent. lighter than our coke. On asking the foreman if it were customary with them to weigh their iron and coke charges, he said it was and that they were particular about this point. However, on inquiring how much coke per charge they used when using the lighter coke, he said they used 30 buckets, containing 80 lb. to the bucket, this making 2400 lb. of coke on the bed to 3000 lb. of iron, and between the charges he used 4 buckets or 320 lb. Bear in mind that this firm had complained that our coke was exceedingly high in ash on account of it being so heavy as compared with the other coke which they had been using, but the foreman used as much of it in bulk as he had of the lighter coke, viz., 30 buckets on the bed and 4 buckets between the charges. We had 10 of these buckets filled up with our coke, and to his surprise they averaged 105 lb. coke per bucket, or about 30 per cent. more coke by actual weight. On pointing this fact out to the foreman he immediately said he should have obtained hotter iron on account of using more coke. This was not true. From my experience, I am more afraid of foundrymen using too much coke than of not using enough. After using up the entire ten cars, the general manager of this concern wrote us they had had most excellent results, and suggested that when sending our coke to a new customer, full instructions on the use of it should be given.

PROPER SAMPLING A REQUISITE

Another matter to which I would like to call your

attention is the chemical analysis reported by quite a few commercial chemists as well as chemists employed by the consumers. Now and then we receive a report that our coke runs as high as 20 per cent. in ash, notwithstanding that this matter is watched very closely by our own operating department, competent chemists being on the job all the time who make from five to fifteen determinations of our daily product. When we get a report that our coke shows an analysis over 14 per cent. in ash, we find that the chemist or foundryman is pulverizing his coke sample in an old pot taken from the scrap pile, or an ordinary cast iron mortar. In one case the foundry was pulverizing samples on an iron plate, using an air hammer which had been used for tamping concrete and was still covered with cement. Coke is a strong abrasive material and this can be confirmed by taking a piece of beehive coke and holding it against the side of an emery wheel for a few minutes. On stopping the wheel you will find you have made quite an impression on it. In pulverizing coke in an ordinary cast iron mortar fine particles of iron are cut from the mortar and go into the sample so increasing the ash 1.40 times the weight of actual metallic iron, because when the coke sample is burned off in the determination of ash, the metallic iron is turned to an iron oxide which is 1.40 times greater.

The only method by which coke samples can be properly reduced to powder to make a satisfactory determination of chemical analysis is on a chrome steel bucking board, a diamond steel mortar or case hardened steel mortar commonly used for pulverizing ferromanganese. The American Society for Testing Materials has a committee working on standard specifications for coke. I hope it will work in conjunction with the committee on the standard analysis of coal and coke for a standard method of preparing coke samples so that controversies over chemical analysis will be practically eliminated.

C. M. SCHWERIN ON BY-PRODUCT COKE

Mr. Schwerin went into the details of the construction of by-product ovens and their operation, pointing out the varying results obtained by using different coals and mixtures of coals and by the manipulation of the ovens. Some coal swells to such an extent while being coked that the walls of the oven bulge. One of the troubles of early by-product oven practice resulted from failure to crush the coal fine enough. Many coals which will not coke well in a beehive oven will produce good metallurgical fuel in a by-product oven, and this is one reason why the latter process has been so extensively developed abroad. Connellsville coal, when used in a by-product oven, makes a different coke from that produced in the beehive oven. Some coals must be mixed before they can be coked by the retort method.

Mr. Schwerin said that the output of the beehive oven is not always equal to the theoretical yield, while with the by-product type it often is greater. If all coke were made by the newer method the disposal of all the by-products might be a serious problem, though the tar has been used with success as a fuel in open-hearth furnaces. The use of sulphate of ammonia should be greater as it is a valuable fertilizer, and its use abroad accounts for some of the foreign success in intensive farming. The use of gas in large cities should stimulate the building of by-product ovens, though here enters the question as to what the ovens are primarily intended for. He knew of a case where one company handled the by-products of a plant and another was interested in the coke, and the result was a continual pulling apart, both believing that the plant was not handled to conserve their best interests. Where a highly volatile coal is used the production of gas is much greater than otherwise. The present practice is to mix high and low volatile coals.

Prejudice is the basis of the opposition which has to be overcome in extending the use of by-product coke in the foundry. Mr. Schwerin said he remembered when he shipped coke to a foundry with the understanding that a sample could be taken for a test heat before the shipment was accepted. In the same locality a premium is now paid for the coke. He stated emphatically that in foundry practice a good by-product coke will give all the desirable results that can be obtained from beehive coke.

One difficulty to be faced in the establishment of the by-product coke industry is the great difference in initial cost. A by-product plant of 60 ovens costs about $1,000,000 and incidentally takes much longer to build. By-product oven projects, he said, are usually started in times of boom and by the time the ovens are completed an industrial depression is apt to be on, as at present. To be profitable a by-product plant must be located near some large user of gas, which can afford to pay a good price. He did not consider Buffalo a good location, except in the case of a plant which enjoyed such advantages as those created by the Lackawanna Steel Company. One strong objection to Buffalo is the switching charge on coal in that city. The commercial side of a by-product plant also depends on its distance from Connellsville, in view of the fact that the prices of coke are based on the Connellsville price plus freight.

MARKETING BY-PRODUCT COKE IN THE EAST

Mr. MacDonald, of Snead & Co., president of the association, in introducing Mr. Barkley, said he believed it to be about time that by-product coke was offered in the Newark market, and he understood that it soon would be.

Mr. Barkley said that with his company the making of coke is the first consideration. As was well known certain ovens had not met expectations, inasmuch as they could not make 19-hr. coke without breaking down, but Koppers ovens are being installed, and the time would soon be ripe for placing by-product coke on the market.

R. J. M. Welch, Samuel L. Moore & Sons Corporation, Elizabeth, said his company had used by-product coke and had obtained good results. They had tried different hights of beds, various blasts, etc., and had succeeded in increasing their melting ratio and tons per hour. The average melt of one cupola had been increased from 13 tons to 15½ tons per hr.

POINTS IN THE DISCUSSION

Mr. MacDonald believed that the prejudice of foundrymen against by-product coke was based on their being accustomed to the silvery appearance of beehive coke, to which Mr. Schwerin added that he considered that a black top was due to insufficient coking, and that such a product was not good, though the coke from the top of the oven and that around the doors was apt to be dark.

Mr. Barkley said that a part of by-product coke always looks dark, but the darkest piece, if punctured, would show a silvery color. The dark color might come from delay in quenching or from some other lack of judgment. Mr. MacDonald also said a chemist friend held to the belief that coke which had been exposed to the elements for some time was more liable to carry sulphur into the iron than fresh coke, but Mr. Schwerin gave the opinion that coke could lie for 10 years without injury.

The Reading-Bayonne Steel Casting Company was elected to membership in the association.

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Iron and Steel Market Symptoms

Efforts to forecast the future of the iron and steel market may be based upon a study of extraneous influences, the condition and prospects of general trade, or upon scrutiny of the iron and steel trade's own symptoms and developments. The distinction between the two lines of reasoning is a broad one, and an exact illustration of the difference may be given. If we see a man out in a cold rain without adequate protection, we predict that he will take cold. The general conditions prompt such a prediction. If we hear a man sneeze, we say he is taking cold, because he himself has disclosed a well recognized symptom of taking cold.

Of the two methods of forecasting with respect to the iron and steel trade, the first enables one to see farther ahead than does the second, but whether either is more accurate than the other in all cases no statement can be made. For some time past, and until quite recently, efforts to forecast the iron and steel market's future had to depend entirely upon the first method, for the trade had not begun to furnish any symptoms that were in the least trustworthy. In our issues of November 5 and November 12 we attempted to discuss the probable future according to the first method, referring to general trade conditions and prospects. Since then, in the past three or four weeks, the iron and steel trade itself has begun to exhibit symptoms which may perhaps be discussed with some profit.

The most pronounced symptom has been the buying of pig iron, which started with a rather spectacular movement at Buffalo and has since extended with more or less force to several other districts. The essence of this movement, where it has occurred, has been that of "calling the turn" on the part of buyers, rather than of providing for any large increase in requirements. In recent years the steel works have become so self-contained that a movement in pig iron, even though it led to very material advances in prices, would not have a direct influence to force steel prices upward, but the merchant pig-iron market and the steel market proper have so much in common that it is reasonable to suppose that as a rule what occurs in the one market will occur in the other. A review of the precedents shows that when the movement in either is large it is invariably followed by a similar movement in the other, but when there is a small movement in either, the other trade may fail to exhibit any. Neither trade always takes the lead. In 1907 the Eastern pig-iron market began to decline early in the year, and the Central Western Valley market in June, whereas finished steel prices did not decline at all that year, except for the disappearance of premiums for prompt shipment. In the great revival of 1909 pig-iron prices and steel prices began to move upward at about the same time, and in the volume of buying the two markets likewise kept closely in step. In the general recovery of 1912 the two markets were likewise in step. In the summer of 1913 there was a recovery in pig iron, with none at all in steel, but the pig-iron movement was a relatively small one. Last summer, on the other hand, there was a slight recovery in steel, with practically none in pig iron.

From these and other precedents we may conclude that if the present pig-iron movement proves to be a large one, it will be accompanied by a similar movement in steel, but it is not certain that up to date it has been large enough to prove the case. The augury, however, is clearly a favorable one.

The steel trade proper has shown clear and familiar symptoms of the inception of at least a small movement. Stocks in the hands of buyers have become extremely small, and there is a large number of orders for very small quantities. The mills are making a definite campaign to book prompt business, and are quoting lower prices for prompt shipment than upon contracts for specification during the first quarter. These conditions are of precisely the same character as those that obtained in November, 1911, in December and January last, and in June and July last. In each of those periods there was booked an increased quantity of business, the movement being followed by an advance in mill prices. In the two later cases the strength acquired soon disappeared. In the first case there was likewise a recession, but thereupon a fresh start was made and the great rise of 1912 finally resulted.

From this evidence, supported by the pig-iron exhibit, the conclusion may be reached that a movement in steel has begun, but that it is uncertain whether it will prove to be a major or a minor movement. There are some grounds for an argument that the movement will prove to be major. In November, 1911, when a very low point was reached in steel prices, production was relatively heavy, and it was not so easy for the country to absorb increased quantities. Production of pig iron was then running at 78 per cent. of its best previous rate, whereas today pig-iron production

is running at barely over 50 per cent. of its best previous rate. A comparison of the rate of steel production shows a still greater divergence, so that, despite all that may be unfavorable in general business and financial conditions—and in this respect the conditions are on the whole much more favorable than a month or two ago—it should be relatively easy for the steel trade to undergo a decided recovery.

Constructive Congressional Legislation

The opening this week of the short session of Congress is attended with the usual surmises and forecasts of probable legislation. It seems to be taken for granted that, despite the announced determination of some members of Congress to bring forward additional anti-trust legislation, such efforts will not meet with the approval of those who are most influential in directing the activities of the dominant party in Congress. Bearing on this point the Mechanics-American National Bank of St. Louis, in a recent circular, says: "From high sources the statement has come that the time of Congress will not be taken up after this with unsettling proposals. On the contrary, it will be the aim of those in charge of legislation to pursue a really constructive course." The significance of this statement lies in the fact that it comes from Missouri and not from some Northern source. This is in line with what President Wilson said September 10 in his noteworthy letter to the committee of railroad presidents as well as in his message to Congress personally communicated on Tuesday.

It is perhaps too much to expect that in this brief session Congress will take up the important question of revising the tariff to meet the new conditions which are now confronting the country. Business men are deeply considering the prospects of a serious invasion by European manufacturers if the war on the other side of the Atlantic should be suddenly terminated. There has been no damage thus far to the manufacturing establishments of Germany, the source from which we must expect the most competition. The early termination of the war would cause German manufacturers to put forth the most strenuous efforts to regain their trade with outside markets. They would push their exports to all countries to the utmost for the purpose of making up the losses which have been sustained through the interruption to their manufacturing operations. The United States, with its low tariff, would be a most promising market. It is estimated by competent authorities that, while the war in Europe is now curtailing our imports, if peace had not been broken the monthly excess of our imports over exports would by this time have amounted to over $50,000,000 at least, or about the same amount as our usual favorable trade balance.

With the European war ended, our foreign trade will be in a still worse condition. This is a most important matter, and if it is not taken under consideration at this time by Congress it will certainly loom up as a problem to be solved in the course of the next twelve months. Even a low-tariff majority would be unable to withstand the general demand that would then come for relief from a sustained trade depression.

Tin Plate Contracts for 1915

The great annual event in the American tin plate trade is the fixing of the "season price." This year this occurred on Thursday, December 3, the price named being $3.20 per base box for 100-pound coke plates, comparing with a price of $3.40 named November 3, 1913, and a price of $3.60 developed early in September, 1912. The successive declines are due, of course, to the declines in raw material. The cost of steel and pig tin forms a large part of the cost of making tin plate. At present market prices, delivered, the steel for a base box of 100-pound tin plates costs about $1 and the pig tin about 75 cents. Allowing for the concession usually given to very large buyers and the cash discount, only 42 per cent. of the selling price goes for all expenditures outside of steel and pig tin, thus covering the numerous other raw materials and supplies involved, the heavy wage cost, and repairs, depreciation and profits. The coal consumption is heavy, being about weight for weight, while the wage cost is well in excess of 50 cents a box.

The tin plate mills usually make money, but they always run great risks, and this year they are running much greater risks than usual. In exceptional cases mills may be in such position as to be protected against advances in steel, when they have sold their finished product for the year, but as a rule they must take the chances of an advance in the steel from which more than half the product will be made.

With pig tin there is likewise a great risk. Tin cannot be bought for more than about three months ahead. It is possible to protect a greater portion of the future, however, by buying an excessive quantity for the latest delivery commonly quoted, and then as the time of delivery comes around sell that tin and at the same time buy tin for later delivery. If the tin plate sales were absolute the protection thus obtainable would be fairly adequate, but there is the great danger that tin may decline, the tin plate market soften and the tin plate mill be forced to rewrite many of its sales contracts, while it must still take the pig tin at the full purchase price.

For these reasons there has been a desire on the part of the mills to discontinue the practice of selling for the entire season, but thus far no definite progress has been made. This year the official announcement of price is accompanied by a statement that it is for the first six months of 1915 only, but competition in contracting will probably result in many of the contracts being written for the usual period. The reform, however, is greatly to be desired.

The Federal Trade Commission

The general dissatisfaction prevailing with regard to the manner in which the Interstate Commerce Commission is handling the exceedingly important questions intrusted to it is causing much concern in business circles regarding the composition of the new Federal Trade Commission. It is believed that no commission that Congress has created in years has been clothed with such power for good and evil as the Federal Trade Commission.

For this reason it is hoped that the President will appoint men who have practical and not merely theoretical knowledge. This is the only way in which the commission can be constituted so that it will not prove a continuing menace to the orderly procedure of business. The report is said to come from White House circles that President Wilson is convinced "that the corporations have been hammered enough and that he will appoint a different set of persons from the sort of meddlesome, inquisitorial and biased officials" that a certain class of politicians expects to see on this body. It is not so much the wording of the act of Congress creating the commission that business men fear as the kind of officials who will compose it. The President's appointments to official positions have not turned out uniformly well, but he stands to win high praise if in this instance he shows wisdom in discerning the qualifications that should be possessed by those chosen to serve as commissioners.

CORRESPONDENCE

Simultaneous Buying Urged as a Means of Starting a Revival

To the Editor: For over a year now the iron and steel industries and all plants dependent on them have been under an unparalleled business depression. This depression continues in spite of the optimistic expressions from some officials of our very large steel mills. While these opinions appearing in various journals have been in the past a wonderful tonic to the spirit of our sales forces, they are now becoming in some respects a menace. Frequently directors and stockholders in various concerns throughout the country are misled by these articles and insist that the officials of their companies make radical changes in their selling forces, while in the next breath they insist that purchases of much needed supplies must cease until business conditions open up.

Some of the most wonderful selling forces in the country are being torn apart for their failure to produce business. Sales managers and salesmen, who have been the life of their concerns for years, are becoming disheartened and feel that they are no longer successful and have outlived their usefulness.

For more than a year we have blamed in succession the holding up of the railroad rate decision, the coming election, the European war, and now the last and ever ready excuse is that the fag end of the year is always dull. It is certain that after January 1 another very plausible excuse will appear on the horizon, when the expected rush fails to materialize. With all these excuses fading away and still no stimulation in sight, with the splendid working forces in our shops being laid off and thrown on the community for charity—forces that have been marshaled after years of sorting over thousands of employees—can we not come to the conclusion that the business depression is our own fault. In our endeavors to cut expenses we have lost sight of the fact that purchases must balance sales, and that the clamp we have placed on our buying has completely stopped business. It is absolutely useless to sit and wait for the railroads to buy rails. This is only one item; whereas, if every concern in the United States, regardless of its size or the nature of its work, would at one time, say December 21, place orders for supplies, the stimulation to stagnated business and flagging spirits would be wonderful. It would not be well to confine the buying to one line, even though a large order, but rather a number of miscellaneous orders should be given for materials for repairs and restocking.

Suppose that buyers as a body should place their orders for the materials represented in approved requisitions just now lying on their tables and held up awaiting starting up of business. Were such an array of apparently lifeless orders thrust upon the market, our sales forces would at once see the rising sun of business so long looked for, and our shopmen who have been working 30 per cent. or less would enjoy their Christmas with the feeling that we were emerging from the depths of a horrible depression. Bear in mind that what you buy is bound to be purchased back from you, or if it is an addition to equipment will repay you, if all carry out such a chain plan of starting up work. No concern should be cowardly and await with interest the efforts of a few. If every railroad official, corporation head, shopkeeper and private individual will take a hand in the movement success is assured to all. If our country were invaded by a foreign foe we would all rush to the front, giving up careers and possibly our lives to a cause not more worthy than that which now calls for a supreme effort. We are so engrossed with the European war that we fail to appreciate the awfulness of the commercial war now raging between our own buying and selling forces, with our shop workers in the position of Belgium, suffering for the acts of others and unable to help themselves.

Our country in its position of neutrality to the war, with its reserve banks ready to pour out money for legitimate business and our stock exchanges feeling their way toward opening again for active work, is just ripe for a commercial revival. Such a buying day as proposed above, with the endorsement of prominent business men, could not help but succeed, and its success would cause more happiness than all the tag, button, bundle and flower days we have had in years. In fact, such a day would start a chain of work that would obviate the necessity of many local charity benefits.

I hope the readers of *The Iron Age* will try to enlist co-operation in this plan, if only to telephone one or two business acquaintances and interest them to make some purchase, at least, on Monday, December 21.

F. C. SULLIVAN.

Braddock Machine & Mfg. Company.

Braddock, Pa., December 1, 1914.

Harbison-Walker Refractories Company

The Harbison-Walker Refractories Company, Pittsburgh, has issued its twelfth annual statement, covering the year ended September 30, 1914. President W. H. Croft, in his accompanying statement, says that, considering the unsatisfactory condition of business in the last half of the year, the officers and directors regard the showing made as satisfactory. The combined profit and loss account is as follows:

Earnings after deducting $358,563.68 for repairs and maintenance, which covers depreciation of plants		$1,376,129.60
Extraordinary expenditures for improvements	$176,961.94	
Depreciation of mining and tram outfits	40,845.81	
Depletion of clay, coal and ganister properties	33,334.09	
		251,141.84
Net profit		$1,124,987.76
Dividend on preferred stock	$576,000.00	
Dividend on common stock	360,000.00	
		936,000.00
Net surplus		$188,987.76
Surplus September 30, 1913		$6,090,777.12
Surplus September 30, 1914		6,279,764.88

The balance sheet shows no bonded indebtedness and current liabilities of only $1,036,378.17, against current assets of $3,960,710.85, besides investment securities amounting to $1,068,861.50.

The American Hoist & Derrick Company, St. Paul, Minn., reported voluntarily dissolved in *The Iron Age* November 26, has merely ceased to do business as a corporation. It is now a co-partnership, of which Oliver Crosby, F. J. Johnson and W. O. Washburn are the managing partners. It retains its offices at 50 Church street, New York.

HILL IRON ORES IN 1915

Sales Through M. A. Hanna & Co.—Steel Corporation Completes Minimum Shipments

With the expiration of the lease of the Steel Corporation January 1, the output of the Great Northern or Hill mines will enter into direct competition with other Lake Superior merchant ores during the coming season. The trustees of the Great Northern Ore properties have made a contract with M. A. Hanna & Co., Cleveland, by which the latter company will act as the selling agent for all the Hill mines with the exception of the Dean and Itasca mine, which was recently leased to the Tod-Stambaugh Company, Cleveland. The stripping of this mine, which is estimated to have 5,500,000 tons of ore, was completed some time ago and the first shipments will be made from it in the coming season.

Various estimates have been made as to how much ore is available to be shipped from the Hill mines in 1915, but that is a commercial rather than a mining question and the output will be determined largely by the demand for ore and that in turn by conditions in the iron and steel industries. The shipments from the Hill mines reached a maximum in 1912, when they were 7,490,509 tons. In 1913 they declined to 5,236,890 tons. Figures are not yet available as to the shipments during 1914, but it is believed they amounted to the minimum requirement of 6,000,000 tons for the year and 440,463 tons additional, the total shipments to January 1, 1914, having fallen behind the minimum required under the lease by the last named amount. The total shipments of the Steel Corporation this year were about 16¾ million tons. The corporation has nearly exhausted some of the Hill mines. However, the development of such property as was surrendered by its subsidiary, the Great Western Mining Company, on March 1, 1914, has been continued by the Arthur Iron Mining Company, which in addition to development work will have charge of the operation of all the Hill mines except the Dean and Itasca, after January 1. In addition to this two other large mines have been stripped—the Smith, having 6,000,000 tons of ore, and the Dunwoody, with 8,000,000 tons. The latter will be ready for shipping in the coming season.

That the Arthur Iron Mining Company is going ahead with further development of the property is indicated by the letting of a contract to strip 8,500,000 cubic yards from a property known as the Hill Annex, adjoining the Hill mine in which the Steel Corporation and the Great Northern have each a one-half holding in the fee. This is said to be the largest stripping contract ever let in the Mesaba range. The official estimate of the ore in the Hill properties January 1, 1914, was 411,499,154 tons. The possibility of purchases of Hill ores by the Steel Corporation is naturally discussed, but nothing has been done in that direction. Conditions in the steel trade from year to year will determine, and the advantage of buying ores that might be offered at attractive prices, permitting of the conservation of the corporation's own deposit. The Steel Corporation's interest in the Hill mine fee will also make available to it a considerable tonnage from that property, since what it has thus far mined there has been under the terms of the Great Northern lease.

The Peninsular Machinery Company, Detroit, Mich., which was recently incorporated with $10,000 capital stock, has been formed for the purpose of buying and selling machinery tools. It will maintain show rooms in the Kerr Building, and is the exclusive agent for the R. K. LeBlond Machine Tool Company, Cincinnati, in Michigan, but will also sell other lines of machine tools. Frederick Eberle is secretary and treasurer of the company.

Austin A. Holbeck, engineer, Rockefeller Building, Cleveland, Ohio, has taken a contract for installing a powdered coal fuel system in the new works of the Middletown Steel Car Company, Middletown, Pa., a subsidiary of the Standard Steel Car Company.

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Ohio Manufacturers' Association

At a meeting of the Ohio Manufacturers' Association, held in Columbus, December 3, the following officers were elected for the ensuing year: President, Charles E. Lozier, Elyria; first vice-president, John G. Battelle, Columbus; second vice-president, C. B. McCoy, Coshocton; third vice-president, W. K. Leonard, Piqua; secretary, Malcolm Jennings, Columbus; treasurer, George A. Archer, Columbus; general counsel, Daniel J. Ryan, Columbus. Executive committee, C. Wood Walter, Cincinnati; A. B. Jones, Akron; George W. Perks, Springfield; Charles R. Clapp, Toledo.

S. P. Bush, retiring president of the association, made an address reviewing the business conditions of the country. He called particular attention to the necessity of rehabilitating the credit of the railroads as the first important step toward industrial revival. Other speakers included George M. Verity, president American Rolling Mill Company, Middletown; Joseph H. Frantz, Columbus; W. H. Stackhouse, Springfield, and Jacob D. Cox, Jr., Cleveland. Among resolutions adopted at this meeting was one urging the Interstate Commerce Commission to grant the application of the railroads for an increase in freight rates, "believing such action will be decidedly conducive to the best interests of business generally and the public at large."

The December meeting of the Chicago Foundrymen's Club will be held Saturday, December 12, at the Hotel Sherman. The club will entertain its members and their families at dinner, following this with an illustrated lecture describing the sojourn in the Philippines of Dr. R. A. White, the well-known travel lecturer. The club is trying to make the evening an unusual occasion.

LOWEST POINT SINCE 1908

November Pig-Iron Output 1,518,316 Tons

Only 147 Furnaces in Blast December 1, with Annual Capacity of 17,700,000 Tons

Pig-iron production fell off heavily in November and the curve in the accompanying diagram shows, the steepest angle in many months. For the 30 days of November the total was 1,518,316 gross tons, or 50,611 tons a day, against 1,778,186 tons in October, or 57,361 tons a day. The production of steel works furnaces fell off 5700 tons a day and that of merchant furnaces over 1000 tons a day. At the opening of December only 147 furnaces were in blast, showing a loss of 11 in November, and the capacity active was 48,464 tons a day, as compared with 53,253 tons a day on November 1. Production was thus at the rate of about 17,700,000 tons a year of coke iron, which is the smallest rate since September, 1908, the year after the panic.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from November, 1913, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel works	Merchant	Total
November, 1913	52,434	22,019	74,453
December	41,879	22,108	63,987
January, 1914	40,691	20,117	60,808
February	47,479	19,974	67,453
March	54,990	20,748	75,738
April	54,508	21,157	75,665
May	47,028	20,478	67,506
June	44,321	19,595	63,916
July	45,027	18,123	63,150
August	46,937	17,426	64,363
September	46,344	16,409	62,753
October	41,026	16,335	57,361
November	35,305	15,306	50,611

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in November and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Aug. (31 days)	Sept. (30 days)	Oct. (31 days)	Nov. (30 days)
New York	117,567	109,569	112,818	113,675
New Jersey	10,698	8,559	6,860	6,910
Lehigh Valley	52,112	49,115	57,905	59,527
Schuylkill Valley	66,584	56,604	55,171	49,772
Lower Susquehanna and Lebanon Valley	32,163	31,217	33,988	33,674
Pittsburgh district	507,250	483,973	430,804	352,508
Shenango Valley	70,752	68,391	65,267	56,076
Western Pennsylvania	99,178	104,778	109,217	120,959
Maryland, Virginia and Kentucky	49,561	38,186	36,217	35,222
Wheeling district	72,787	80,289	75,014	51,593
Mahoning Valley	237,909	214,916	195,910	148,640
Central and Northern Ohio	140,019	126,208	130,473	130,850
Hanging Rock and S. W. Ohio	15,118	11,314	19,185	18,460
Chicago district	287,533	267,339	226,012	143,288
Mich., Minn., Mo., Wis. and Col.	62,643	63,258	49,518	41,355
Alabama	156,623	152,453	157,696	138,412
Tennessee	16,764	16,408	16,131	17,395
Total	1,995,261	1,882,577	1,778,186	1,518,316

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production			Spiegeleisen, ferromanganese, etc.		
	1912	1913	1914	1912	1913	1914
Jan.	1,483,153	1,981,560	1,261,430	22,622	15,633	17,325
Feb.	1,550,995	1,792,154	1,329,414	15,950	20,131	10,524
Mar.	1,827,792	1,904,878	1,704,688	11,538	20,546	20,133
Apr.	1,830,717	1,939,751	1,635,226	11,104	23,108	18,676
May	1,922,557	1,991,192	1,457,847	20,518	19,042	21,504
June	1,823,958	1,860,070	1,229,623	26,685	19,212	16,254
July	1,803,205	1,840,216	1,395,851	26,522	22,310	16,524
Aug.	1,843,404	1,833,352	1,455,054	24,225	20,680	11,577
Sept.	1,773,073	1,828,232	1,390,322	22,484	24,555	13,786
Oct.	1,947,426	1,848,634	1,271,820	27,252	19,499	17,435
Nov.	1,884,524	1,573,007	1,059,159	17,461	26,765	21,977
Dec.	1,976,870	1,298,262	.....	18,523	14,095	.....

CAPACITY IN BLAST DECEMBER 1 AND NOVEMBER 1

The following table shows the daily capacity in gross tons, of furnaces in blast December 1 and November 1, by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Dec. 1 Number in blast	Dec. 1 Capacity per day	Nov. 1 Number in blast	Nov. 1 Capacity per day
New York:					
Buffalo	19	10	3,338	9	3,030
Other New York	7	2	451	2	450
New Jersey	7	1	230	1	221
Pennsylvania:					
Lehigh Valley	22	7	1,311	7	1,691
Spiegel	2	2	177	2	177
Schuylkill Val.	16	4	1,411	5	1,780
Lower Susquehanna	7	2	557	2	535
Lebanon Valley	10	3	565	3	561
Pittsburgh dist.	52	23	10,688	27	12,555
Ferro.	4	2	239	2	217
Shenango Val.	19	5	1,869	5	1,825
Western Pa.	26	11	3,970	11	3,472
Ferro.	1	1	125	1	94
Maryland	4	1	366	1	384
Wheeling district	11	5	1,719	5	1,745
Ohio:					
Mahoning Val.	25	11	4,885	12	5,451
Central and Northern	24	10	4,069	10	4,225
Hanging Rock & S. W. Ohio	15	5	715	5	580
Ill. and Ind.	34	10	4,356	14	6,327
Ferro	2	1	70	1	66
Michigan, Wis. & Minn.	10	3	768	3	810
Colc. and Mo.	8	2	695	2	750
The South:					
Virginia	24	3	431	3	378
Kentucky	5	2	377	2	264
Alabama	45	15	4,434	18	5,072
Ferro.	1	1	68	1	68
Tennessee	20	5	580	4	525
Total	423	147	48,464	158	53,253

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The fluctuations in pig-iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons

	1907	1908	1909	1910	1911	1912	1913	1914
Jan.	71,149	33,918	57,975	84,148	56,752	66,384	90,172	60,808
Feb.	73,038	37,163	60,976	85,616	64,090	72,442	92,369	67,453
Mar.	71,821	39,619	59,232	84,459	70,036	77,591	89,147	75,738
Apr.	73,885	38,289	57,962	82,792	68,836	79,181	91,759	75,665
May	74,048	37,603	60,753	77,102	61,079	81,051	91,039	67,506
June	74,486	36,444	64,656	75,516	59,585	81,358	87,619	63,916
July	72,763	39,287	67,793	69,305	57,841	77,738	82,601	63,150
Aug.	72,594	42,851	72,546	67,963	62,150	81,046	82,057	64,363
Sept.	72,783	47,300	79,507	68,476	65,903	82,128	83,531	62,753
Oct.	75,386	50,554	83,856	67,520	67,811	86,722	82,133	57,361
Nov.	60,937	51,595	84,917	63,659	66,648	87,697	74,453	50,611
Dec.	39,815	56,158	85,022	57,349	65,912	89,766	63,987	.....

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1910—Gross Tons

	1910	1911	1912	1913	1914
Jan.	2,608,605	1,759,326	2,057,911	2,795,331	1,885,054
Feb.	2,397,254	1,794,509	2,100,815	2,586,337	1,888,670
Mar.	2,617,949	2,171,111	2,405,318	2,763,563	2,347,867
Apr.	2,483,763	2,064,086	2,375,436	2,752,761	2,269,955
May	2,390,180	1,893,456	2,512,582	2,822,217	2,092,686
June	2,265,478	1,787,566	2,440,745	2,628,565	1,917,783
July	2,148,442	1,793,068	2,410,889	2,560,646	1,957,645
Aug.	2,106,847	1,926,637	2,512,431	2,545,763	1,995,261
Sept.	2,056,275	1,997,102	2,463,839	2,505,927	1,882,577
Oct.	2,093,121	2,102,147	2,689,933	2,546,261	1,778,186
Nov.	1,909,780	1,999,433	2,630,854	2,233,123	1,518,316
Dec.	1,777,817	2,043,270	2,782,737	1,983,607	.....

Among the furnaces blown in last month were the A stack of the Buffalo Union in New York, one Lock Ridge in the Lehigh Valley, one Carrie in the Pittsburgh district, one Lorain in Ohio, and Rockdale in Tennessee.

The furnaces blown out in November include one Bethlehem in the Lehigh Valley, one Swede in the Schuylkill Valley, one Shoenberger, two Carrie and two Duquesne in the Pittsburgh district, one Ohio and one Youngstown Sheet & Tube Company in the Mahoning Valley, one Central in northern Ohio, Star in the Hang-

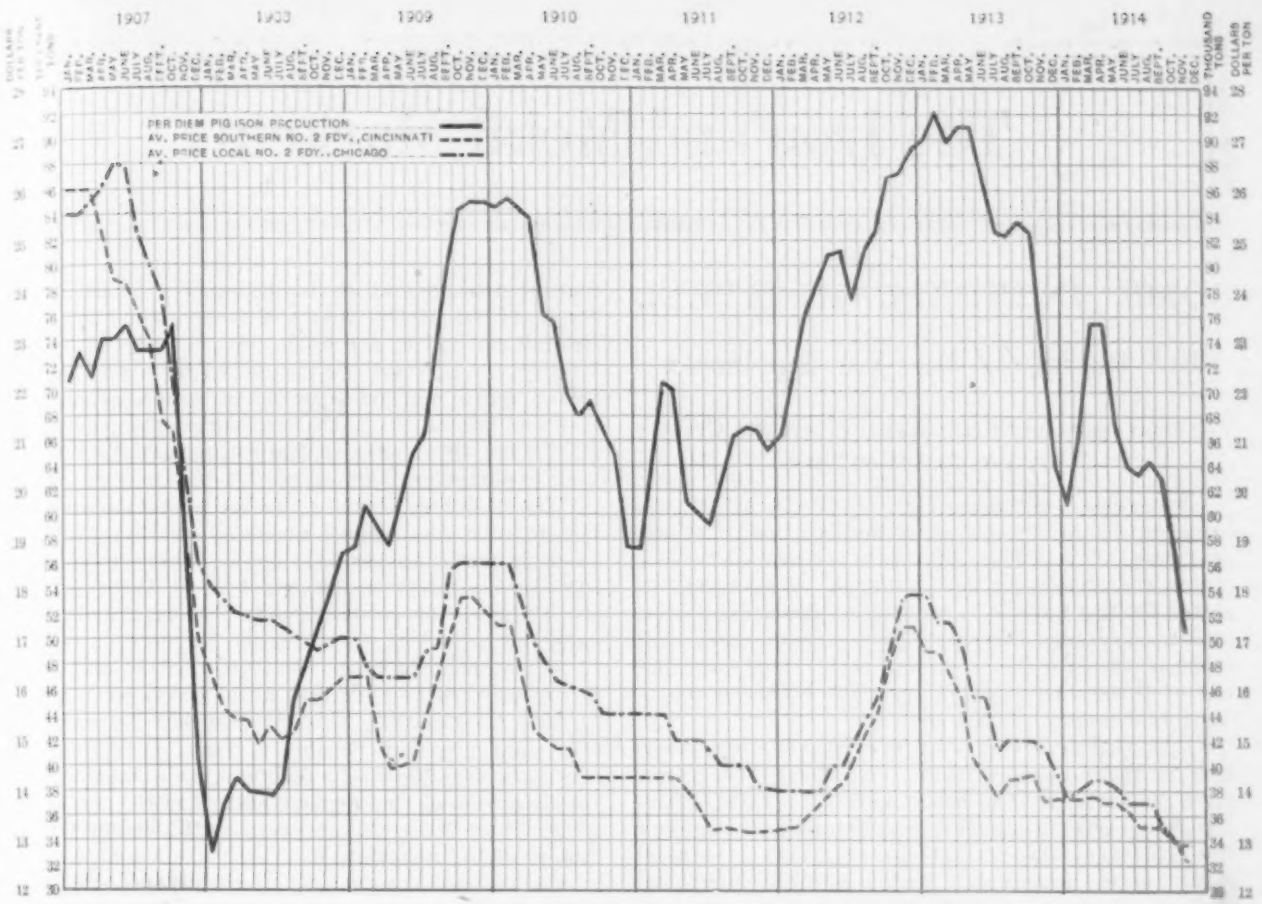

Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to December 1, 1914: Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

ing Rock district, one South Chicago (banked), two Gary and one Madeline in the Chicago district and one North Birmingham, Philadelphia and one Ensley in Alabama.

Metal Prices Soaring in Germany

According to the Frankfurter Zeitung, it is expected that the German government will shortly fix maximum selling prices for copper, aluminum, antimony, nickel and other metals, hoping that by this measure stocks held back in the expectation of higher prices will be brought on the market. The Kölnische Zeitung states that a committee has been formed which is negotiating with manufacturers and others concerning the maximum prices to be fixed. As soon as an understanding has been reached, the Federal Diet will issue the necessary official order and this may be expected shortly. The Frankfurter Zeitung states that one reason for the present alarming advance in the price of metals in Germany is the closing of the trade routes by Britain, and it protests strongly against England preventing Germany from receiving supplies through neutral countries. The policy of the War Metals Company of requiring dealers to disclose their stock of metals every four weeks has failed to prevent hoarding by speculators. The following are the metal prices in Germany just before the war and recently, as given by the London Ironmonger in pounds and shillings:

	Price in July per ton	Price in November per ton
Copper	£62 10s. to £64	£110
Aluminum	£80	£225 to £250
Antimony	£22 10s.	£100
Nickel	£162 10s.	£275 to £300

Roller Bearings for Heavy Machinery

The American Roller Bearing Company, 614 Farmers' Bank Building, Pittsburgh, Pa., recently installed roller bearings in some heavy presses used in the manufacture of brick. The bearings replaced the plain ones formerly employed, and have a shaft diameter of 4 7/16 in. and an over-all length of 13¼ in. These bearings take the direct drive from a 150-hp. motor at a speed of 475 r.p.m. It is stated that as a result of the installation of these bearings the amount of power required for the operation of the presses has decreased 25 per cent. Other installations recently made include bearings for cement and steel mill machinery, cranes, fans, electric locomotives and coal mining equipment.

The new plant of the company on Melwood avenue, near Baum boulevard, will be occupied on January 1. This plant is of reinforced concrete construction with a large amount of glass surface, and will give practically four times the capacity of the present plant at Penn avenue and Water street. A very large heat treating department forms a part of the equipment. Indications at the present time point to the full operation of the new plant.

War Affects the Iron and Steel Institute

At a business meeting of the Iron and Steel Institute held in London, December 19, Dr. Arthur Cooper presided in the enforced absence of Dr. Adolph Greiner, president of the institute. It was stated that Dr. Greiner, who was managing director of the Cockerill Works at Seraing, Belgium, is still practically a prisoner in his own house, which is occupied by German officers. While in good health, he is said to have aged greatly under the trying experiences of recent months.

A number of persons were elected to membership in the institute. Dr. Cooper stated that owing to its international character the institute was likely to be seriously affected by the war. It has 32 Belgian members, 61 French, 21 Russian, 11 Japanese, 71 German and 30 Austrian. Of the 101 German and Austrian members 12 have already sent in their resignations. It is hoped, however, that there will be increases in the number of Belgian, French and Russian members.

The plant formerly occupied by the Bucyrus Steam Shovel & Dredge Company, Bucyrus, Ohio, has been acquired by outside capitalists who will remodel the building and convert it into an automobile tire factory.

The Iron and Metal Markets

SOME INCREASE IN STEEL

But Buying Is Not Yet Significant

Pig Iron Movement Apparently Past the Crest—Output Cut Sharply

December buying of steel products which was expected to follow rather promptly upon the appearance of a 1.05c. Pittsburgh price for bars, plates and shapes, is not yet large. Five weeks of better feeling have done something for order books, and buying has increased in the past week, but there is thus far no repetition of the free contracting of three years ago, or even of the lesser movement in January of this year.

It is still true that when any considerable business is done prices suffer. But there are rather plain indications that the response to 1.05c. Pittsburgh quotations has not been enough to convince the mills that the market can be lifted by temporarily going under it. Hence more is heard of 1.10c. for bars, plates and shapes for the first quarter, while 1.05c. applies to earlier deliveries, reaching in some cases into and through January.

The pig iron market acts as though the crest of the buying wave was seen last week. With a few exceptions, the purchases by foundries were of moderate size and some of them were based also on expectations of usual castings contracts. Their effect on prices is not yet clear. Buffalo furnaces are firm at $13 for No. 2 X iron. At Chicago sales last week were generally below $13 at furnace which is now asked, while in the Central West prices of the past two weeks remain, and in Southern iron $9.75, Birmingham, is still to be had for the first half of 1915.

December sales of Southern iron are put at 100,000 tons including about 50,000 tons to pipe foundries. At Pittsburgh in the past week 24,000 tons, mostly Northern iron, was bought for sanitary foundries, making a total of 90,000 tons of foundry and steel making iron in that district in two weeks. Cincinnati reports that the recent buying of foundry iron there foots up more than was indicated at the time and at Cleveland last week's selling was on a good scale, one firm's orders being 20,000 tons, 80 per cent. being foundry grades and the remainder malleable. A large steel foundry company has just bought 7500 tons of basic iron for the first half of 1915 at $12.50 at Valley furnace.

Pig iron production dropped sharply in November, being 1,518,316 gross tons, or 50,611 tons a day. The 147 furnaces active December 1, a loss of 11 in the month, were producing at the rate of 48,464 tons a day, against 53,253 tons a day on November 1. Thus the country is now producing at a yearly rate of about 17,700,000 tons, the lowest since September, 1908, or a little more than half the maximum rate of February and March, 1913, which was about 34,000,000 tons.

The Santa Fe railroad has increased its rail orders for 1915 to 67,000 tons, adding to the 13,000 tons being rolled at Chicago an order for 54,000 tons for the Colorado mill. In the international rail market Queensland is inquiring for 20,000 tons, Denmark for 10,000 tons and Greece for 5000 tons. British rail prices are up 2s 6d.

Exports of steel are hampered by high freights and a more marked scarcity of vessel room. To England 25s to 30s is the current market, which at $23.75 for sheet bars in the Swansea Valley makes such exports far from attractive to American mills.

The so-called season price on tin plate came out December 3, the largest producer quoting $3.20, or 20 cents less than the 1914 basis. Some makers are limiting contracts to the first half of 1915. Due to the demand for canned goods for export, 1915 is expected to be a banner year in tin plate.

Wire products have been more active and lower at $1.50 for wire nails and $1.30 for fence wire.

The Connellsville coke market has shown more stir since pig iron became active. At Pittsburgh contracts for 50,000 to 60,000 tons a month have just been closed for the first half of next year, mostly at $1.65 to $1.70 at oven, with 50,000 tons a month under negotiation.

Old material has scored slight advances in Western markets, after many weeks of dragging on the bottom. Heavy melting steel has shown more life in the Central West and prices are firmer under the expectation of a larger operation of steel works in January.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	Dec. 9, 1914.	Dec. 2, 1914.	Nov. 11, 1914.	Dec. 10, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	$14.25	$14.25	$14.50	$15.25
No. 2, Valley furnace...	12.75	12.75	12.75	13.50
No. 2 Southern, Cin'ti...	12.65	12.65	12.90	14.25
No. 2, Birmingham, Ala.	9.75	9.75	10.00	11.00
No. 2, furnace, Chicago*	13.00	13.00	12.50	14.75
Basic, del'd, eastern Pa..	13.50	13.50	14.00	15.00
Basic, Valley furnace....	12.50	12.50	12.50	12.75
Bessemer, Pittsburgh....	14.70	14.70	14.55	15.90
Malleable Bess., Ch'go*..	13.00	13.00	13.00	14.75
Gray forge, Pittsburgh...	13.40	13.40	13.40	13.90
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh.	19.00	19.00	19.50	20.00
O.-h. billets, Pittsburgh..	19.00	19.00	19.50	20.00
O.-h. sheet bars, P'gh...	*19.50*	20.00	20.00	21.00
Forging billets, base, P'gh.	24.00	24.00	24.00	24.00
O.-h. billets, Phila.....	21.40	21.40	21.40	22.40
Wire rods, Pittsburgh...	25.00	25.00	25.50	25.00
Old Material. Per Gross Ton:				
Iron rails, Chicago.....	$11.00	$11.00	$11.00	$13.00
Iron rails, Philadelphia.	13.00	13.00	13.00	15.50
Carwheels, Chicago.....	9.50	9.50	9.75	12.00
Carwheels, Philadelphia.	**10.00**	9.50	9.50	12.00
Heavy steel scrap, P'gh.	**10.50**	10.00	10.00	11.00
Heavy steel scrap, Phila.	9.25	9.25	9.25	10.00
Heavy steel scrap, Ch'go.	8.25	8.25	8.00	9.00
No. 1 cast, Pittsburgh...	10.50	10.50	10.50	12.00
No. 1 cast, Philadelphia	11.00	11.00	11.00	12.00
No. 1 cast, Ch'go (net ton)	**9.00**	8.50	8.50	9.75
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	**1.17**	1.12	1.12	1.25
Iron bars, Pittsburgh....	1.15	1.15	1.15	1.35
Iron bars, Chicago.....	0.90	0.90	0.95	1.15
Steel bars, Pittsburgh...	1.10	1.10	1.10	1.20
Steel bars, New York....	1.26	1.26	1.31	1.36
Tank plates, Pittsburgh..	1.05	1.05	1.10	1.20
Tank plates, New York..	1.26	1.26	1.26	1.36
Beams, etc., Pittsburgh..	1.10	1.10	1.10	1.25
Beams, etc., New York..	1.26	1.26	1.26	1.41
Skelp, grooved steel, P'gh	1.10	1.10	1.10	1.20
Skelp, sheared steel, P'gh	1.15	1.15	1.15	1.30
Steel hoops, Pittsburgh..	1.25	1.25	1.25	1.40

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Dec. 9, 1914.	Dec. 2, 1914.	Nov. 11, 1914.	Dec. 10, 1913.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.85	1.85	1.90	1.90
Galv. sheets, No. 28, P'gh	2.80	2.85	2.90	2.90
Wire nails, Pittsburgh	1.50	1.55	1.60	1.55
Cut nails, Pittsburgh	1.55	1.60	1.60	1.55
Fence wire, base, P'gh	1.30	1.60	1.60	1.55
Barb wire, galv., P'gh	1.90	1.95	2.00	1.95
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.50	$1.50	$1.50	$1.75
Furnace coke, future	1.75	1.75	1.75	1.80
Foundry coke, prompt	1.90	1.90	1.90	2.50
Foundry coke, future	2.15	2.15	2.15	2.60
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	13.00	13.00	11.50	15.00
Electrolytic copper, N. Y.	12.75	12.75	11.25	14.37½
Spelter, St. Louis	5.50	5.20	4.80	5.00
Spelter, New York	5.65	5.35	4.95	5.15
Lead, St. Louis	3.67½	3.67½	3.40	3.85
Lead, New York	3.80	3.80	3.50	4.00
Tin, New York	32.50	33.15	34.25	37.50
Antimony, Hallett's, N. Y.	15.00	15.00	15.50	7.00
Tin plate, 100-lb. box, P'gh	$3.20	$3.15	$3.15	$3.40

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal on plates, shapes, etc., is 46c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.05c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.10c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.30; galvanized, $1.70. Galvanized barb wire and fence staples to jobbers, $1.90; painted, $1.50. Wire nails to jobbers, $1.50. Woven wire fencing, 73 per cent. off list for carloads; 72 off for 1000-rod lots; 71 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	1.90	1.95	2.00	2.05	2.15	2.25	2.65	2.75

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from November 2, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	74	53½	⅛ and ¼	66	47
½	78	67½	⅜	65	46
¾ to 3	81	72½	½	69	56
			¾ to 2½	72	61

Lap Weld

2	78	69½	1¼	56	45
2½ to 6	80	71½	1½	67	56
7 to 12	77	66½	2	68	58
13 and 14	63½	..	2½ to 4	70	61
15	61	..	4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	79	70½	1 to 1½, butt	70	59
2, lap	76	67½	2, butt	70	59
2½ to 6, lap	78	69½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	69	58½	⅜	63	52
½	74	67½	½	67	60
¾ to 1½	78	71½	¾ to 1½	71	62
2 to 3	79	72½	2 and 2½	72	63

Lap Weld, extra strong, plain ends

2	75	66½	1½	65	59
2½ to 4	77	68½	2	66	58
4½ to 6	76	67½	2½ to 4	70	61
7 to 8	69	58½	4½ to 6	69	60
9 to 12	64	53½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	64	57½	½	57	49
¾ to 1½	67	60½	¾ to 1½	60	52
2 to 2½	69	62½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	65	58½	2	55	49
2½ to 4	67	60½	2½ to 4	60	54
4½ to 6	66	59½	4½ to 6	59	53
7 to 8	59	48½	7 to 8	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1⅝ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3½ in.	70	2½ to 2¾ in.	54
3½ and 4½ in.	72	3 and 3½ in.	57
5 and 6 in.	65	3½ and 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots

from store, as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 to 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.50
No. 12	1.50
Nos. 13 and 14	1.55
Nos. 15 and 16	1.60
Nos. 17 to 21	1.65
Nos. 22 and 24	1.70
Nos. 25 and 26	1.75
No. 27	1.80
No. 28	1.85
No. 29	1.90
No. 30	2.00

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.80 to 1.85
No. 12	1.90 to 1.95
Nos. 13 and 14	1.90 to 1.95
Nos. 15 and 16	2.05 to 2.10
Nos. 17 to 21	2.20 to 2.25
Nos. 22 and 24	2.35 to 2.40
Nos. 25 and 26	2.50 to 2.55
No. 27	2.65 to 2.70
No. 28	2.80 to 2.85
No. 29	2.95 to 3.00
No. 30	3.10 to 3.15

Pittsburgh

PITTSBURGH, PA., December 8, 1914.

The better feeling in the steel trade recently noted is developing into actual business. Some fairly large contracts for tin plate have been placed for first half of 1915 delivery, also for plates, shapes and bars. There has been further heavy buying of pig iron, and some contracts for sheet bars for first quarter are reported closed. Some large contracts for furnace coke have been placed, and prices of scrap are firmer. Consumers are taking more interest in the whole market, and it is believed there will be continued heavy buying through all of this month, mostly for first quarter. It is confidently believed that the turn has been reached.

Pig Iron.—The heavy purchases noted last week have been followed by others. The Standard Sanitary Mfg. Company has bought 8000 tons of Southern foundry iron for its Louisville works, and 16,000 tons of Northern foundry for its Allegheny and New Brighton plants, all for delivery in the first half of 1915. A radiator company east of this city has bought 6000 to 8000 tons of foundry iron for first quarter delivery. The American Steel Foundries has bought more basic, taking 7500 tons from a Sharpsville furnace, for first half, at $12.50 at furnace. In standard Bessemer iron sales are reported of 500 tons for first half and 200 tons for December-January, both at $14, Valley furnace. Prices are firm. We quote Bessemer iron at $13.75 to $14; basic, $12.50; malleable Bessemer, $12.75; No. 2 foundry, $12.75 to $13; gray forge, $12.50, all at Valley furnace, with a freight of 95c. a ton for delivery in the Cleveland or Pittsburgh district.

Billets and Sheet Bars.—A considerable tonnage of sheet bars is under negotiation for first quarter. Several tin-plate mills that have not covered are in the market. Specifications against contracts from sheet mills are reported slightly better. We quote Bessemer and open-hearth billets at $19, and Bessemer and open-hearth sheet bars $19.50, f.o.b. maker's mill, Youngstown; Bessemer and open-hearth billets, $19, and Bessemer and open-hearth sheet bars, $19.50 to $20 f.o.b. maker's mill, Pittsburgh. Forging billets are quoted at $24 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are quoted at $21 to $22.

Ferroalloys.—So far consumers of English ferromanganese have been getting prompt deliveries, the amount coming in being large enough to meet the present needs of the steel works. It is believed, however, that later there may be difficulty in getting a supply, particularly if the steel mills should get on a heavier operating basis. English 80 per cent. is still held at $68, seaboard, but for prompt shipment from stocks at seaboard points as high as $75 is asked. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20, and 12 per cent., $21, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Steel Rails.—Nothing has yet been heard regarding the Norwegian order for 25,000 tons of standard sections, bids for which were opened late last month. No large export orders for rails have lately been placed. The domestic demand is also dull, but it is believed there will be some buying by the leading railroads early in 1915. The Carnegie Steel Company received new orders and specifications in the past week for about 1500 tons of light rails. We quote standard section rails, made of Bessemer stock, at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots. 8 and 10 lb. sections, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. Extras over the above prices are as follows:

Bond drilling, one hole	$0.045 per 100 lb.
Bond drilling, two holes	0.090 per 100 lb.
Bond drilling, one hole in flange	0.090 per 100 lb.
Bond drilling, two holes in flange	0.180 per 100 lb.
All 30 ft. and special lengths, down to but not including 12 ft.	0.045 per 100 lb.
Special lengths, 12 ft. and under	0.090 per 100 lb.
Notching	0.025 per 100 lb.

The above prices are for carload lots, the usual differentials being allowed for large lots.

Structural Material.—New inquiry is heavier than for some time. A considerable number of projects are under way, some of which it is believed will soon go through, that will require a large amount of material. The fabricators say they are figuring on more work than for some months. The Moss Iron Works, Wheeling, W. Va., has taken 600 tons for a new steel building for the Clarksburg Glass Company, Clarksburg, W. Va. We quote beams and channels up to 15-in. at 1.10c. through first quarter of 1915, but desirable orders for prompt shipment could be placed at 1.05c., Pittsburgh.

Plates.—Reports that inquiries for 7000 steel cars are in the market cannot be verified here. The only active inquiries out include one from the Clover Leaf for 1800 wooden box cars with steel underframes, and one from the Union Tank Line for 500 tank cars, with an option asked on 500 more. As yet the new demand for plates is dull, but it is expected to be better early in the new year. We quote ¼-in. and heavier plates at 1.05c. to 1.10c., f.o.b. Pittsburgh, depending on the order and deliveries wanted.

Sheets.—Consumers evidently believe that prices are pretty close to bottom, as inquiries are increasing. Several large mills are holding prices at 1.85c. for No. 28 black and 2.85c. for No. 28 galvanized sheets for delivery in first quarter, but others will shade these prices possibly $1 per ton, especially on galvanized sheets, which are more easily obtainable at 2.80c. than No. 28 black at 1.80c. Sheet mills are running to less than 50 per cent. of capacity. We quote No. 28 Bessemer black sheets at 1.85c.; No. 28 galvanized, 2.80c. to 2.85c.; Nos. 9 and 10 blue annealed, 1.35c. to 1.40c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Wire Rods.—No large sales were made the past week for export, but there is still a fair amount of domestic inquiry. Domestic consumers who have not covered for first half will probably do so to some extent this month. Specifications only fair. We quote Bessemer, open-hearth and chain rods at $25, f.o.b. Pittsburgh, but on a desirable order probably $24.50 could be done.

Tin Plate.—On Thursday, December 3, the American Sheet & Tin Plate Company and other leading makers announced the price for next year as $3.20 per base box for 14 x 20 coke plates, but for delivery only through first half. Sales agents have been instructed that where customers wish to cover for all 1915, the facts in each case must be submitted to the home office before a price will be named for second half delivery. The price announced is slightly less than anticipated. Pig tin is selling now at about 34c. per lb., against 40c. in November last year when the price of $3.40 was named on tin plate and sheet bars a year ago were about $1.50 higher than they are now, so that the reduction of 20c. per base box from that of a year ago seems fully justified. It is believed that the new price will have more stability than it would have had if it had been made at a higher figure. The very large customers will be allowed slight differentials as formerly. Before this month is out a good part of the tin plate to be consumed in the first half of 1915 will be under contract; some large orders have already been placed. Operations among the tin-plate mills up to about February 1 will be slack, but after that time they will start work on their contracts. We now quote 100-lb. 14 x 20 coke plates at $3.20. Terne plate is still selling at about $3.10 per base box, but the American Sheet & Tin Plate Company's price is 5c. higher.

Wire Products.—Makers report much activity in the wire trade. Mills are running to nearly full capacity, a good deal of the product being for export. Sales of barb wire for export continue heavy and there is also foreign inquiry for plain wire. This is the dull season in wire nails. On desirable orders wire nails are selling at $1.50 and plain annealed wire at $1.30. We quote: Wire nails, $1.50; plain annealed wire, $1.30; galvanized barb wire and fence staples, $1.90; painted barb wire, $1.55, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. off for cash in 10 days. We quote steel cut nails at $1.55, f.o.b. Pittsburgh, in carload lots. We quote woven wire fencing at 73 per cent. off in carload lots, 72 on 1000-rod lots and 71 on smaller lots, all f.o.b. Pittsburgh.

Iron and Steel Bars.—Large consumers of steel bars who have not covered for first quarter and first half are showing more interest in the market and negotiations are under way involving a very large aggregate. Some business has been closed for first quarter at 1.10c. base, but for second quarter makers are quoting 1.15c. The new demand for common iron bars is quiet and none of the local mills is running to more than about 50 per cent. We quote merchant steel bars at 1.10c. for delivery through first quarter of 1915 and common iron bars at 1.15c., f.o.b. Pittsburgh.

Shafting.—New demand is light. Specifications from automobile builders are fairly heavy. We quote cold-rolled shafting at 67 per cent. off, delivered in base territory.

Nuts, Bolts and Rivets.—Negotiations are now on with large consumers for their requirements for the first half. Current demand is dull. We quote structural rivets at 1.45c. and boiler rivets at 1.55c. in carload lots, small lots taking an advance of about 10c. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blank and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.P.C. and r sq. nuts, blank and tapped	$6.00 off list
Hexagon nuts, ⅝ in. and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. or under	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 & 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, tin plated, packages	80, 10 and 5% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set-screws	75, 10 and 10% off

Skelp.—Some foreign inquiry is being received, mostly from England. A local mill has sold in the past three months a very large amount of grooved steel skelp for export. Domestic demand is dull. We quote: Grooved steel skelp, 1.10c. to 1.15c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.50c.; sheared iron skelp, 1.50c. to 1.60c., delivered to consumers' mills in the Pittsburgh district.

Hoops and Bands.—Large consumers are figuring on covering their needs for first quarter. Some business is reported closed on the basis of about 1.10c. for bands, with extras as per the steel bar card, and 1.25c. for steel hoops. For prompt shipment these prices would be shaded about $1 per ton.

Merchant Steel.—Two local mills report new orders better, consumers taking more interest in the market. It is probable that some large contracts for seasonable steels for shipment through first quarter will be closed this month. Prices on small lots for prompt shipment are about as follows: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Wrought Pipe.—Actual orders for pipe placed so far this month have shown a slight increase over the same period in November. Not much active buying is expected until after the first of the year. Nothing more has been heard of the Oklahoma inquiry for 600 miles of line pipe. Mills are still running to only about 35 per cent. of capacity. Discounts on iron and steel pipe are being firmly held, in spite of the dull demand.

Boiler Tubes.—There is a little better demand for locomotive and merchant tubes, but none of the mills is running to more than 30 to 35 per cent. of capacity. Discounts are still materially shaded.

Old Material.—The scrap offered by the Pennsylvania Lines West, amounting to 10,000 tons or more, was sold last week at somewhat higher prices than have recently ruled. It is said that most of the selected heavy steel scrap was sold to Youngstown mills at about $10.85, delivered. There is a better feeling in the trade, and prices are higher, due to more active inquiry. Heavy steel scrap is up about 50c., while borings, turnings and bundled sheet scrap are about 25c. a ton higher. For delivery to consumers' mills in the Pittsburgh and other consuming districts that take Pittsburgh freights dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$10.50 to	$10.75
Compressed sides and end sheet scrap	$9.00 to	9.25
No. 1 foundry cast	10.50 to	10.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.25 to	8.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to	12.00
No. 1 railroad malleable stock	10.00 to	10.25
Railroad grate bars	9.00 to	9.25
Low phosphorus melting stock		13.00
Iron car axles	18.75 to	19.25
Steel car axles	13.25 to	13.75
Locomotive axles, steel	19.75 to	20.25
No. 1 busheling scrap	9.00 to	9.25
No. 2 busheling scrap	6.00 to	6.25
Machine shop turnings		7.50
Old carwheels	10.75 to	11.00
Cast-iron borings		8.00
*Sheet bar crop ends	10.50 to	10.75
Old iron rails	12.75 to	13.00
No. 1 railroad wrought scrap	10.75 to	11.00
Heavy steel axle turnings	8.25 to	8.50
Heavy breakable cast scrap	10.25 to	10.50

*Shipping point.

Coke.—More contracts for furnace coke have been closed. Two leading Buffalo consumers have closed for about 25,000 tons a month through first half, while three blast furnaces in the Central West have

bought from 25,000 to 30,000 tons a month for the same delivery. Inquiries now out for furnace coke for first half involve fully 50,000 tons a month more. Prices show some variation. Part of the above business was closed at $1.65 to $1.70 per net ton at oven, but two or three leading makers are holding particularly high grades of blast furnace coke at $1.75 for first half. As yet but little has been done in foundry coke. We quote strictly high grade blast furnace coke for prompt shipment at $1.50 to $1.60 and for delivery through first half of 1915 at $1.65 to $1.75 per net ton at oven. The output of coke in the upper and lower Connellsville regions for the week ended November 28 is given by the Connellsville Courier as 179,439 tons, a decrease over the previous week of 21,365 tons.

Chicago

CHICAGO, ILL., December 9, 1914.—(*By Wire.*)

In all branches of the market, business during the past week seems to have done a little better than hold its own. Save for the pig-iron and scrap markets there was, however, little activity. The selling of pig iron is continuing, though at a slightly diminished rate and without material gain in price. In connection with the scrap market one sees perhaps the most serious taking hold of the favorable outlook, and speculation in old material has given to the present movement a considerable momentum. The purchases of rails by the Santa Fé have now reached the total of 67,000 tons, and much encouragement has been taken from this fact, although it remains entirely a guess as to whether other roads will follow in like manner. The railroads are very generally considering their first half requirements of machine bolts, track fastenings and the lighter products for which they regularly contract. The lack of success of local mills in seeking structural, plate and bar business for immediate rolling seems to have in a measure discouraged the low-price campaign particularly prominent a week ago, and the market is slightly better in that respect. For the first quarter a considerable number of contracts for steel have been placed, but the tonnage both separately and in the aggregate has been held within very conservative limits.

Pig Iron.—While there remain for consideration in this market enough inquiries to keep producers on edge the activity has now been sufficiently prolonged to permit of covering by the majority of consumers. With the few commonly known exceptions this buying movement has been one very largely concerning the foundry of average size, and in addition has been practically limited in this immediate market to the gray-iron founders. The buying has been in a way conservative. The aggregate tonnage sold has hardly been up to the total which might be indicated by the degree of activity. A review of the buying period shows that the earlier sales, and by quite a majority the larger proportion of all sales, were made at prices below $13 at furnace, Chicago. As late as last week transactions at such levels were noted. Charcoal iron has been selling with proportionate activity; in fact there seems to have been a greater placing of charcoal than malleable iron. Certain charcoal producers whose furnaces have been out of blast for some months are considering relighting their stacks with the first of the year. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	13.50 to 14.00
Northern coke foundry, No. 2	13.00 to 13.50
Northern coke foundry, No. 3	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft	14.25 to 14.50
Southern coke, No. 2 f'dry and 2 soft	13.75 to 14.25
Malleable Bessemer	13.00 to 13.50
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—The Santa Fé has placed its order with the Colorado mill for approximately 54,000 tons of rails, bringing the aggregate of its contracts up to about 67,000 tons. Additional contracting for spikes and bolts is noted, and minimum prices have been advanced $1 a ton above our last quotations. Sales of tie-plates include 5000 tons to the Burlington. We quote standard railroad spikes at 1.50c. to 1.60c., base; track bolts with square nuts, 1.90c. to 2.00c., base, all in carload lots, Chicago; tie plates, $23.50 to $25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Local sales offices report the booking of slightly heavier specifications, though the improvement is hardly great enough to be significant. There are indications at the end of the week that it was decidedly more difficult to secure quotations on plain material under 1.25c., Chicago. Fabricated steel work continues scarce, the largest contract reported placed during the week calling for 770 tons for a new building at the University of Chicago, the steel to be fabricated by the Morava Construction Company. The Pacific Rolling Mill Company took the contract for 335 tons for a postoffice at San Francisco, and the American Bridge Company 176 tons for bridge spans at Boone, Iowa. We quote for Chicago delivery of plain shapes from mill 1.20c. to 1.25c.

We quote for Chicago delivery of structural material from stock, 1.75c.

Plates.—The principal inquiry for cars is that of the Union Tank Line for 500 tank cars. The Northern Pacific has placed its order with the Pullman Company for 112 passenger cars which will require about 1600 tons of steel. The Santa Fé has also made purchases of some miscellaneous equipment. The unwillingness of the mills to sell plates in large tonnage at the lowest prices that have been made seems to have been responsible for a discontinuance of these quotations and 1.25c. is again the regular basis. We quote for Chicago delivery of plates from mill 1.20c. to 1.25c.

We quote for Chicago delivery of plates from stock, 1.75c.

Sheets.—Despite the advancing market for spelter prices for galvanized sheets have shown increasing weakness, and the average buyer is now able to place business on the basis of 2.80c., Pittsburgh. Black sheets, in which there is probably less competition, are only slightly stronger. The volume of business available continues restricted. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.539c.; No. 28 black, 2.039c.; No. 28 galvanized, 2.989c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.55c.

Bars.—There is little, if any, improvement in the market either for steel or iron bars, although the advances being asked for scrap have in a way stiffened the policy of bar-iron makers. The amount of business is so discouragingly small, however, that little progress can be made in the direction of strengthening prices. We quote for mill shipments as follows: Bar iron, 0.90c. to 1c.; soft steel bars, 1.189c. to 1.25c.; hard steel bars, 1.15c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—Both jobbers and the railroads are evidencing a lively interest in the placing of contracts for bolts for the first quarter and first half. The low prices prevailing for bars are in a measure responsible for a particular interest at this time. We continue to quote: Carriage bolts up to ⅞ x 6 in., rolled thread, 85; cut thread, 80-20; larger sizes, 80; machine bolts up to ¾ x 4 in., rolled thread, 85-5; cut thread, 85; larger sizes, 80-5; coach screws, 85-10; hot pressed nuts, square head, $6.60 off per cwt.; hexagon, $7.60 off per cwt. Structural rivets, ¾ to 1¼ in., 1.58c., base, Chicago, in carload lots; boiler rivets, 10c., additional.

We quote out of store: Structural rivets, 2.20c.; boiler rivets, 2.30c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅞ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Wire Products.—The increase in contracting for wire and nails is not more than is expected at this time of the year and is, if anything, upon a very modest basis as to tonnage. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.539; wire nails, $1.739; painted barb wire, $1.739; galvanized, $2.139; polished staples, $1.739; galvanized, $2.139, all Chicago.

Cast-Iron Pipe.—Municipal lettings of 5000 tons at Dayton, Ohio, a small tonnage at Hammond, Ind., and 150 tons at Neoga, Ill., were taken by the leading interest. Bids are being taken this week on 300 tons at Cuba, Ill., and 500 tons at Council Bluffs, Iowa. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Old Material.—Progress in the campaign to establish higher prices for scrap has been made to the extent that some consumers are taking in material at the advance. On the other hand, sales are still noted of old material, under some necessity of being moved, at prices which are nearly equivalent to the low point of the market. There can be little doubt, however, that an actual advance has been effected on any tonnage for which a consumer might enter the market. Of the scrap recently offered by the railroads a considerable portion has been sold direct to melters and at prices competitive with those being offered by dealers and brokers. Additional offerings of railroad scrap include 900 tons by the Soo Line, 2700 tons by the Illinois Central, 1000 tons by the Omaha, 3500 tons by the Santa Fé and 800 tons by the Northern Pacific. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$11.00 to $11.25
Old steel rails, rerolling	9.50 to 10.00
Old steel rails, less than 3 ft.	9.25 to 9.50
Old carwheels	9.50 to 10.00
Heavy melting steel scrap	8.25 to 8.50
Frogs, switches and guards, cut apart	8.25 to 8.75
Shoveling steel	8.00 to 8.25
Steel axle turnings	6.50 to 7.00

Per Net Ton

Iron angles and splice bars	$10.50 to $11.00
Iron arch bars and transoms	10.75 to 11.25
Steel angle bars	7.25 to 7.75
Iron car axles	14.00 to 14.25
Steel car axles	10.25 to 10.75
No. 1 railroad wrought	7.75 to 8.25
No. 2 railroad wrought	7.25 to 7.50
Cut forge	7.25 to 7.50
Steel knuckles and couplers	8.00 to 8.50
Steel springs	9.00 to 9.50
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.00 to 5.25
Cast borings	4.50 to 4.75
No. 1 busheling	6.75 to 7.25
No. 2 busheling	5.75 to 6.25
No. 1 boilers, cut to sheets and rings	5.00 to 5.50
Boiler punchings	7.75 to 8.00
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	7.75 to 8.25
Grate bars	7.50 to 8.00
Railroad malleable	8.00 to 8.25
Agricultural malleable	7.25 to 7.50
Pipes and flues	6.00 to 6.25

Philadelphia

PHILADELPHIA, PA., December 8, 1914.

The placing of orders for urgently needed maintenance-of-way materials by railroads, as well as requests for miscellaneous products from other directions, made the sales reports of some of the mills in this territory range from 50 to 100 per cent. better for the week ended December 5. With the inquiry for miscellaneous products was shown a desire for deliveries immediately after the first of the new year, at which time more activity on the part of the railroads is looked for also. There is apprehension that the hoped-for increase in exports may be seriously hampered by the scarcity of ships and the consequent high ocean freight rates; some materials, including barb wire and billets, already having been delayed in shipment. Prices present an unsatisfactory phase of the market. The mills could easily load up with contracts, but consumers are looking for contracts at bargain prices and these the mills are only willing to allow for prompt delivery and in limited quantities. Offers of 1.20c., Philadelphia, are made, especially for plates and shapes for first quarter, but the mills would like to get 1.30c., and 1.25c. is readily accepted. Bars are a trifle stronger than plates and shapes. Billets continue dull and the demand for sheets is unsatisfactory. Pig iron has been sold heavily for delivery next year at the low prices prevailing, but current consumption shows little or no betterment. The bulk of the movement was in foundry grades, though there has been some buying and a good bit of interest in standard low phosphorus. Basic is quiet. Some large coke contracts have been booked. Old materials have sold in small lots only.

Iron Ore.—The only arrival reported at this port in the week ended December 5 was one of 4800 tons from Cuba.

Pig Iron.—The trade has had a good week in volume of sales, but dissatisfaction with the prices at which business has been done and to some extent still prevail is heard. The buying has been actuated by the fact that the time is ripe for providing for future needs and also by the realization by consumers that prices are low and that they can contract advantageously. Consumers who ordinarily might order 50 or 100 tons are now willing to order several times those amounts, but, as pointed out a week ago, the melt has not increased and the buying does not represent any real betterment in general foundry conditions. Foundry iron in particular has been in good request, though there has been a fairly good call also for standard low phosphorus; at least 8000 tons of the latter was sold on renewal orders at full prices, ranging from $20 to $21. The Midvale Steel Company was one of the purchasers. A little interest in basic running exceptionally low in phosphorus has been shown. Several of the pipe shops are disposed to buy providing they can get bargains. For about 1250 tons of Southern iron, $10 Birmingham was shaded. The Norfolk & Western Railroad has closed for several thousand tons of various grades. Some of the sales, especially of smaller quantities, have commanded at least 25c. over the range quoted a week ago. Virginia iron has shared the better demand, one furnace having almost doubled its sales in the week, although current deliveries are no better. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia No. 2 X foundry	15.25
Virginia No. 2 plain	15.00
Gray forge	13.50 to 13.75
Basic	13.50 to 14.00
Standard low phosphorus	20.00 to 21.00

Ferroalloys.—Dealers are still quoting $68, seaboard, with deliveries subject to various contingencies. Some delayed shipments have not started yet from England, but others have arrived at this port, the arrivals of the week ended December 5 having been 821 tons. An inquiry is out for 1500 tons of 10 to 11 per cent. ferrosilicon by a New Jersey steel casting company. The quotations for 50 per cent. ferrosilicon continue at $71 to $73, Pittsburgh, according to quantity.

Bars.—In steel bars the week has been quiet. The Chesapeake & Ohio Railroad placed an order for 1500 tons, but the business was not taken by independent mills represented here. The quotation for prompt shipments continues at 1.25c., Philadelphia, and desirable business for first quarter delivery would be accepted at this figure though the mills are trying to get 1.30c. Common iron bars are quoted at 1.17c., Philadelphia, in carload lots. Doubled refined iron runs up to 1.85c., Philadelphia. Sentiment is better though actual business does not show much increase.

Plates.—Purchasing was slightly heavier than in the previous week, both as regards the number and size of orders, and one Eastern mill figures that its business would be about normal if the railroads were buying in usual quantity. Reports of better prospects with the shipbuilders continue. While 1.25c., Philadelphia, is the common minimum for prompt business, 1.20c., Philadelphia, has been done in some instances.

Structural Material.—Inquiry of all sorts, and especially that resulting from building, is very light and

the market has been sagging for some days. Prices are unstable, and despite the disposition to make 1.25c., Philadelphia, the minimum, a buyer offering 1.20c. for a good-sized lot would not be turned away. The only proposition mentioned by the trade is the requirement for a few hundred tons of plain and fabricated material for the Panama Canal on which bids have been submitted.

Sheets.—Buying is of a hand-to-mouth character, and consumers are slow also in specifying against contracts entered some months ago when higher prices prevailed. The quotation for No. 10 blue annealed sheets continues at 1.50c., Philadelphia.

Billets.—The market is quiet. It now appears that a new disappointment may come to those who were looking for foreign business in billets and sheet bars for the reason that where sales have been made for export difficulty has been found in getting space in freight vessels. Even when the vessels are found the freight charges are high and still mounting. The quotation for open-hearth rolling billets, delivered here, is $21.40. Rolling steel is about $4 higher.

Coke.—Some excellent contracts have been closed and a good deal of business is still pending. One contract closed for furnace coke was for 80,000 tons for delivery throughout next year, the price obtained being considerably better than $1.75 at oven. First quarter furnace coke is quoted at about $1.65 to $1.70 per net ton at oven and first half at $1.70 to $1.75. Prompt foundry is quoted at $2 to $2.25 and contract foundry at $2.35 to $2.50. Freight rates to this city from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The tone is better, but there has been no buying aside from the taking of small lots. There has been some business in old carwheels and their quotation is 50c. higher. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$9.25 to $9.50
Old steel rails, rerolling	11.50 to 12.00
Low phosphorus heavy melting steel scrap	13.50 to 14.00
Old steel axles	13.00 to 13.50
Old iron axles	17.50 to 18.00
Old iron rails	13.00 to 14.00
Old carwheels	10.00 to 10.50
No. 1 railroad wrought	11.50 to 12.00
Wrought-iron pipe	9.50 to 10.00
No. 1 forge fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	7.50 to 8.00
Cast borings	7.50 to 8.00
No. 1 cast	11.00 to 12.00
Grate bars, railroad	8.00 to 8.50
Stove plate	8.00 to 8.50
Railroad malleable	9.00 to 9.50

Buffalo

BUFFALO, N. Y., December 8, 1914.

Pig Iron.—Orders were principally for small lots, but one furnace in western New York has taken a few thousand tons at less than present ruling prices but at higher than those at which the recent heavy business was done. The capacity of this furnace is now about filled for first quarter. Buffalo furnaces are adhering strictly to their recent advances, having practically booked their capacity for first quarter. Owing to urgent specification on the part of many melters, producers in a large measure have cleaned up yard stocks in most grades and depend on current make to fill orders. Inquiry has dropped off but there are indications that it will revive with business improvement at the turn of the year. We quote prices for first quarter 1915 delivery, f.o.b. furnace as follows:

No. 1 foundry	$13.25 to $13.50
No. 2 X foundry	13.00 to 13.25
No. 2 plain	13.00
No. 3 foundry	13.00
Gray forge	12.75 to 13.00
Malleable	13.00 to 13.25
Basic	13.50
Charcoal, regular grades and analysis	16.25 to 17.25
Charcoal, special grades and analysis	20.50

Finished Iron and Steel.—There has been a little more business than last week. Some second quarter contracts have been taken at $1 per ton higher than for first quarter. For fourth quarter delivery prices remain at 1.10c., Pittsburgh, for bars, plates and shapes and 1.15c. for less than carload lots. The F. L. Heughes Company, Rochester, has 250 tons for the Iola Sanitarium, that city. The 1200 tons for the Cornell University drill hall, Ithaca, has been sublet by the Seneca Engineering Company, Montour Falls, N. Y., among three independent fabricating companies.

Old Metal.—Scrap dealers, confident of steady improvement, are holding prices more stiffly. Prices for several commodities have been advanced but only small tonnages have closed. Following is the current schedule per gross ton f.o.b. Buffalo:

Heavy melting steel	$9.50 to $10.00
Low phosphorus steel	12.50 to 13.00
No. 1 railroad wrought scrap	9.50 to 10.00
No. 1 railroad and machinery cast	10.00 to 10.50
Old steel axles	11.50 to 12.00
Old iron axles	16.00 to 16.50
Old carwheels	10.00 to 10.50
Railroad malleable	9.00 to 9.50
Machine shop turnings	5.00 to 5.50
Heavy axles turnings	8.00 to 8.50
Clean cast borings	5.50 to 6.25
Old iron rails	10.50 to 11.00
Locomotive grate bars	8.50 to 9.00
Stove plate (net ton)	8.00 to 8.50
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	5.75 to 6.25
No. 1 busheling scrap	7.00 to 7.50
No. 2 busheling scrap	5.00 to 5.25
Bundled tin scrap	10.00

Cincinnati

CINCINNATI, OHIO, December 9, 1914.—(*By Wire.*)

Pig Iron.—A much larger quantity of foundry iron was contracted for during the past three weeks than is generally realized by the trade. New purchases of round tonnages almost daily come to light, some of which were made the latter part of last week. Contracting was generaly done on direct solicitation of salesmen and concessions made in regular quotations induced both sides to keep the business under cover. The crest of the buying movement now appears to be passing and not much activity is expected until after the holiday and inventory season is over. However, several inquiries are still up, among which are several from Indiana and Michigan buyers for amounts ranging from 100 to 1000 tons of foundry iron for first half. Some local business is yet unclosed. Among sales is one to a local consumer of 500 tons of Northern and 1000 tons of Southern iron, all for nearby shipment. It is reported that a slight concession in prices was made on account of the customer's willingness to accept the iron for prompt delivery. Both central and northern Ohio have furnished several buyers of foundry iron, but with the exception of a 1000-ton sale of malleable there is little activity in other grades. Basic is very slow in this territory, although reports from other consuming sections indicate that a buying movement is in sight. Southern No. 2 foundry can be bought at $9.75, Birmingham, for delivery through the first half, although most producers are holding out for $10. Northern foundry is unchanged. There is practically no call for silvery iron at present. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$13.15 to $13.65
Southern coke, No. 2 f'dry and 2 soft	12.65 to 13.15
Southern coke, No. 3 foundry	12.15 to 12.65
Southern No. 4 foundry	11.65 to 12.15
Southern gray forge	11.15 to 11.65
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.01 to 15.51
Southern Ohio coke, No. 2	14.01 to 14.51
Southern Ohio coke, No. 3	13.76 to 14.01
Southern Ohio malleable Bessemer	14.26
Basic, Northern	14.51 to 15.01
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—An inquiry from the Hanging Rock district calls for about 15,000 tons of furnace coke, to be shipped in the first half of next year. Both Connellsville and Wise County producers are figuring on the business. Foundry coke continues inactive, except for carload lots wanted by jobbing foundries for immediate shipment. It is generally understood that there will not be any heavy contracting for foundry coke until after January 1. Connellsville furnace coke is quoted around $1.60 to $1.75 per net ton at oven, and foundry grades at $2

to $2.25. Wise County and Pocahontas brands are held about 10c. to 20c. above these quotations.

Finished Material.—The inventory season is too near to expect any large contracts from any source. As a rule, jobbers hesitate to lay in any large stocks until after January 1. Quite a number of small fill-in orders have been received for reinforcing concrete rods, but small structural shapes are not in very good demand. Specifications on contracts for both black and galvanized sheets are coming in at a comparatively satisfactory rate. No. 28 black sheets are quoted at 2.058c., f.o.b. Cincinnati and Newport, Ky., and No. 28 galvanized sheets, 3.058c. Very little railroad track material is being bought. Hoops and bands are quiet.

Old Material.—Prices have stiffened somewhat, and an advance of 25c. a ton can be reported on practically all kinds of scrap. This is due to a better inquiry as well as to an improvement in actual orders received by local dealers. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio, and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.25 to	$6.75
Old iron rails	11.00 to	12.00
Relaying rails, 50 lb. and up	19.75 to	20.25
Rerolling steel rails	9.75 to	10.25
Melting steel rails	8.75 to	9.25
Heavy melting steel scrap	8.50 to	9.00

Per Net Ton

No. 1 railroad wrought	7.50 to	8.00
Cast borings	4.00 to	4.50
Steel turnings	4.00 to	4.50
Railroad cast scrap	9.25 to	9.75
No. 1 machinery cast scrap	9.75 to	10.25
Burnt scrap	6.00 to	6.50
Oil iron axles	13.50 to	14.00
Locomotive tires (smooth inside)	8.75 to	9.25
Pipes and flues	5.50 to	6.00
Malleable and steel scrap	6.75 to	7.25
Railroad tank and sheet scrap	4.50 to	5.00

Cleveland

CLEVELAND, OHIO, December 8, 1914.

Iron Ore.—Ore on Lake Erie docks December 1 aggregated 8,375,014 gross tons as compared with 9,250,500 tons December 1, 1913. During the shipping season just closed the Lake Erie docks received 24,972,362 tons. The final figures on shipments by water for the season make the total amount 32,021,897 tons, or only three tons less than our figures last week, which included an estimate of one cargo (which proved to be 1411 tons) not shipped until December 1. The Steel Corporation's water shipments were about 16,750,000 tons, against 25,000,000 tons in 1913. We quote prices as follows: Old Range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—The buying movement continues, although the market has not been quite so active the past week as the previous week. The leading sanitary interest is reported to have bought close to 10,000 tons of Northern foundry iron and about 6000 tons of Southern for the first half. The northern Ohio pipe works that had an inquiry out for 6000 tons is reported to have purchased for its requirements. One Cleveland sales agency reports orders taken during the week aggregating 20,000 tons in lots of 1000 tons and under, about 80 per cent. of which was foundry iron and the remainder malleable. A Cleveland foundry has taken 1000 tons of Southern foundry, and several other sales of Southern iron in lots of 600 tons and under are reported in northern Ohio territory. A moderate volume of inquiry is still coming out. Prices are unchanged at $12.50 to $12.75, Valley furnace, for No. 2 foundry and $12.50 to $13, Cleveland, for outside shipment. Southern sales are being made at $9.75 to $10, Birmingham, for No. 2 for the first half. We quote, delivered Cleveland, as follows:

Bessemer	$14.70
Basic	13.45
Northern No. 2 foundry	13.25
Southern No. 2 foundry	$13.75 to 14.00
Gray forge	13.00
Jackson Co. silvery, 8 per cent. silicon	17.62
Standard low phos., Valley furnace	20.00

Coke.—There is very little inquiry. Some furnace coke consumers state that they will not contract for the first half, but will buy spot coke as needed. We quote standard furnace coke at $1.50 to $1.60 per net ton at oven for spot shipment. Foundry coke is held at $2.25 to $2.50 for the best grades, the maximum price being for contracts.

Finished Iron and Steel.—The general tone of the market has improved. Specifications are somewhat better and considerable contracting is going on for first quarter delivery in steel bars, plates and structural material, but largely in bars. The general minimum price for contracts for steel bars and shapes is 1.10c., Pittsburgh, but this price can be shaded on plates. For spot shipment steel bars, plates and shapes are being sold down to 1.05c., Pittsburgh, for desirable orders and some steel bars have been taken at this price for delivery in January. One of the leading automobile interests is about to close on its steel requirements for the first half. No new structural inquiries have come out. Alternative bids were taken to-day for the new building for the Willys-Overland Company's plant at Toledo, requiring 1500 or 2500 tons. Sheet prices show weakness. Some contract business has been taken at 1.90c. for No. 28 black, Pittsburgh, and 2.85c. for No. 28 galvanized for the first half. Spot shipment orders are being placed at $1 a ton lower. A sale of forging billets is reported in Cleveland under $23, Pittsburgh. Bar iron continues dull with quotations at 1.05c and 1.10c. for local delivery. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Bolt and nut makers expect to begin to make contracts for the first half about December 15. There is a good volume of inquiry for contracts. Some rivet contracts have been placed at 1.45c. for structural, and 1.55c., for boiler rivets. These prices are being shaded $1 a ton for carload lots for immediate delivery. Discounts are as follows: Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 75 and 15 per cent.; machine bolts with h.p. nuts, ⅝ x 4 in., smaller or shorter, rolled thread, 80 and 25 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 per cent.; coach and lag screws, 80 and 25 per cent.; square h.p. nuts, blank or tapped, $6.30 off; hexagon h.p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9/16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—Youngstown mills have bought between 8000 and 10,000 tons of heavy melting steel scrap for December and January delivery at $10.50 to $11, the latter price being an advance of 50c a ton over that of a week ago, and it is reported that they are in the market for additional tonnage. Locally the market continues quiet. Prices are fairly firm, and slight advances have been made on some grades. There is some inquiry out for busheling for January delivery, on which prices have advanced 25c. a ton. Dealers are asking 25c. more for heavy steel in the Cleveland market and 50c. more for cast scrap. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.00 to	$11.75
Old iron rails		12.00
Steel car axles	11.75 to	12.00
Heavy melting steel	9.25 to	9.50
Old carwheels	10.00 to	10.50
Relaying rails, 50 lb. and over	23.00 to	25.00
Agricultural malleable	8.00 to	8.50
Railroad malleable	9.25 to	9.50
Light bundled sheet scrap	7.50 to	8.00

Per Net Ton

Iron car axles	$16.75 to	$17.00
Cast borings	5.50 to	5.75
Iron and steel turnings and drillings	5.00 to	5.25
Steel axle turnings	6.00 to	6.25
No. 1 busheling, new	8.00 to	8.50
No. 1 busheling, old	7.75 to	8.25
No. 1 railroad wrought	9.00 to	9.50
No. 1 cast	9.75 to	10.25
Stove plate		7.50

Spain's exports of iron ore in the first six months of 1914 were 3,745,509 tons, as compared with 4,894,841 tons in the same period of 1913; of manganese ore, 6460 tons against 11,265 tons to July 1, 1913.

St. Louis

ST. LOUIS, MO., December 7, 1914.

Pig Iron.—The total sales for the week will possibly reach 10,000 tons, including 1500 tons of malleable and 1000 tons to a stove making concern, and 800 tons and 600 tons of foundry iron. All these have been for first quarter and first half delivery. Inquiries still outstanding include 1500 to 2000 tons of malleable and 10,000 to 20,000 tons of basic.

Finished Iron and Steel.—Orders are for small quantities with no immediate disposition to make future contracts. Movement out of warehouse is increasing steadily. We quote for stock out of warehouse as follows: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, 2.55c.; No. 10 galvanized sheets, black sheet gauge, 3.55c.

Old Material.—Demand is for both steel and foundry grades, and some figures have in consequence been marked up. Heavy offerings from railroads included 5500 tons from the Southern, 600 tons from the Terminal Association, 2000 tons from the Wabash, 1000 tons from the Mobile & Ohio, 2000 tons of relaying rails and 1000 tons of scrap from the Minneapolis & St. Louis, 1500 tons from the Northern Pacific, 400 tons from the Kansas City Southern, 600 tons from the Vandalia and 2000 tons from the Missouri, Kansas & Texas, all closed. We quote dealers' prices, f.o.b. St. Louis as follows:

	Per Gross Ton	
Old iron rails	$10.00 to	$10.25
Old steel rails, rerolling	9.50 to	10.00
Old steel rails, less than 3 ft	9.00 to	9.50
Relaying rails, standard section, subject to inspection	21.00 to	23.00
Old carwheels	10.00 to	10.25
No. 1 railroad heavy melting steel scrap	8.25 to	8.50
Shoveling steel	7.75 to	8.25
Frogs, switches and guards cut apart	8.75 to	9.00
Bundled sheet scrap	4.75 to	5.00
	Per Net Ton	
Iron angle bars	$9.50 to	$10.00
Steel angle bars	8.50 to	8.75
Iron car axles	15.00 to	15.25
Steel car axles	10.50 to	10.75
Wrought arch bars and transoms	10.50 to	10.75
No. 1 railroad wrought	7.75 to	8.25
No. 2 railroad wrought	7.50 to	7.75
Railroad springs	8.00 to	8.25
Steel couplers and knuckles	8.25 to	8.50
Locomotive tires, 42 in. and over, smooth	8.25 to	8.75
No. 1 dealers' forge	7.00 to	7.25
Mixed borings	3.50 to	3.75
No. 1 busheling	7.25 to	7.50
No. 1 boilers, cut to sheets and rings	5.25 to	5.75
No. 1 railroad cast scrap	8.50 to	9.00
Stove plate and light cast scrap	7.00 to	7.25
Railroad malleable	6.50 to	6.75
Agricultural malleable	6.00 to	6.25
Pipes and flues	5.50 to	6.00
Railroad sheet and tank scrap	5.50 to	5.75
Railroad grate bars	6.25 to	6.50
Machine shop turnings	4.75 to	5.00

Birmingham

BIRMINGHAM, ALA., December 7, 1914.

Pig Iron.—Sales since the beginning of December have approximated 100,000 tons. One consuming interest is credited with having purchased the past week between 35,000 and 50,000 tons from one maker on a basis of $9.75, Birmingham, for nearby delivery and $10 for forward delivery. Large tonnages that involved December delivery included that concession. This does not mean that the general basis of $10 for the first quarter of 1915 has been reduced. No concessions below that figure for iron for 1915 exclusively have been made as far as can be ascertained. Some interests are asking $10.25 for the second quarter and the same price for small lots for the first quarter and a number of small lots have gone on this basis. The buying has spread over a wide territory, the largest proportion being in the South, where foundrymen are inclined to believe that prices will hereafter tend to rise rather than recede. If any Southern iron went at $9.50 it is believed to have been from furnaces in Tennessee having a freight differential against Birmingham of 50c. and over per ton. Large accumulations are still to be gotten rid of. With one foundry-iron interest having 140,000 tons on its yards and there being a large amount of basic as well, total stocks in Alabama are somewhere around 200,000 tons. The make has been diminished by two furnaces, but even that reduction has not yet affected stocks. Home consumption of basic continues low. The Gulf State Steel Company reports operating its wire mill three days per week and similar conditions prevail at Fairfield. The rail mill of the Tennessee Company resumed again on Monday, working on rails by day and billets by night. We quote, per gross ton, f.o.b. Birmingham district furnaces, for first and second quarter deliveries, as follows:

No. 1 foundry and soft	$10.50 to $10.75
No. 2 foundry and soft	10.00 to 10.25
No. 3 foundry	9.50 to 9.75
No. 4 foundry	9.25 to 9.50
Gray forge	9.00 to 9.25
Basic	10.00 to 10.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—Few additional water-pipe orders are reported, but makers are busy figuring on contracts, both domestic and foreign. Some more pipe for the Pacific coast via Mobile and the canal will leave shortly. Operations at soil-pipe factories are not over 50 per cent., and prices obtained are not especially satisfactory. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $20; 6-in. and upward, $18, with $1 added for gas pipe. Quotations are shaded on attractive specifications.

Coal and Coke.—Cold weather gave a slight impetus to the coal trade, but it was not of long standing. The Sloss-Sheffield Steel & Iron Company has secured the year's contract of the New Orleans Street Railway, Light & Power Company for 175,000 tons of coal. This is a renewal of a contract always placed in Birmingham. Coke would be dull but for the small supply. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $2.95; foundry, $3 to $3.25, with as high as $3.50 for best grades.

Old Material.—Some dealers report a little more activity. However, they are taking on stocks with caution, and the total business is not large. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

New York

NEW YORK, December 9, 1914.

Pig Iron.—The transactions of the past week have given evidence that Buffalo sellers are holding quite firmly to $13 at furnace for No. 2 X iron and that for the most part $13 is the minimum on lower silicon foundry irons at Buffalo. About 3000 tons was placed by one Connecticut foundry of which the greater part went to central Pennsylvania, the delivered price being somewhat above $15.25 for No. 2 iron. About 2500 tons of the order was equally divided between iron carrying 1.5 to 2 per cent. silicon and iron of 2.75 to 3.25 per cent. silicon. A number of sales of several hundred tons each have been made in nearby territory, including one of 500 tons in Brooklyn. A New York interest is in the market for 1500 tons for a Western plant. More buying of pipe iron is looked for, negotiations being now under way with eastern Pennsylvania furnaces. Considerable sales of Southern iron were made last week to pipe foundries and some Southern iron has been sold for shipment to New England foundries. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $14.25 to $14.50; No. 2 X, $14 to $14.25; No. 2 plain, $13.75. Southern iron is quoted at $14.50 to $14.75 for No. 1 and $14 to $14.25 for No. 2.

Ferroalloys.—The deadlock over shipments of ferromanganese from England continues and none is reported as having been released. The situation is more hopeful, however, for the prospects are said to be better that diplomatic negotiations now in progress will result in a satisfactory plan by which consumers, at least, will

be taken care of. The 500 tons, reported last week as being before the market, has been increased to about 1200, but no sales have resulted as far as can be learned. Most of this is for delivery next year and $68, seaboard, is quoted. Prices for spot material average about $75, seaboard. The normal conditions rule in the market for 50 per cent. ferrosilicon, which is quoted at $71 to $73, Pittsburgh, according to the quantity.

Cast-Iron Pipe.—Among new lettings advertised for the near future are those of the city of Baltimore, Md., calling for 7400 tons of 4 to 60 in., on which bids will be opened December 16, and New Britain, Conn., 550 tons, 4 to 16 in., also December 16. Newton, Mass., will open bids to-morrow on 225 tons of 6, 8 and 12 in. Private buying continues in good volume, with more inquiries coming out for prices on spring delivery. The Detroit contract for 25,000 tons has not yet been awarded. Prices have not advanced, carload lots of 6-in. being still available at $20 to $20.50 per net ton, tidewater.

Old Material.—Cast scrap is about the only class of old material showing any degree of activity. Foundries have latterly shown a disposition to take fair quantities of heavy cast and stove plate. Business in rolling-mill stock has been confined to scattering carloads of wrought scrap. Steel works show no interest in heavy melting steel scrap. Dealers maintain confidence in the situation, believing that a buying movement cannot long be deferred. Quotations are continued as follows, per gross ton, New York:

Old girder and T rails for melting	$7.00 to	$7.25
Heavy melting steel scrap	7.00 to	7.25
Relaying rails	19.00 to	19.50
Rerolling rails	8.00 to	8.25
Iron car axles	14.00 to	14.25
Steel car axles	10.00 to	10.50
No. 1 railroad wrought	8.50 to	9.00
Wrought-iron track scrap	8.00 to	8.50
No. 1 yard wrought, long	8.00 to	8.50
No. 1 yard wrought, short	7.00 to	7.25
Light iron	3.00 to	3.50
Cast borings	5.50 to	6.00
Wrought turnings	5.00 to	5.50
Wrought pipe	7.00 to	7.25
Carwheels	8.50 to	9.00
No. 1 heavy cast, broken up	9.50 to	10.00
Stove plate	7.25 to	7.50
Locomotive grate bars	6.00 to	6.50
Malleable cast	6.50 to	7.00

Finished Iron and Steel.—Agents of the French Government have wakened considerable interest in some circles over the probable need of bridges, etc., in France to replace the many that have been destroyed. Some representatives of certain American fabricators have already started on their way to France to attempt to secure such possible orders. It is generally believed that these must be financed here to be secured, however, and some skepticism is heard as to how soon the material will be needed. General improvement is maintained both in sentiment and orders. This is especially true in structural lines where inquiries involving small undertakings are rather numerous and where the awards constitute small projects. There is an absence of large projects, though money is really easy. How soon decided improvement will be manifest is variously regarded. Some expect it early in January while others feel that it may not be until spring, the latter citing the tendency of many to await the decision of directors' meetings before continuing with contemplated projects. New inquiries embrace 1000 tons for a grain elevator at Baltimore, Md., for the Western Maryland Railroad and 1200 tons for a steel pier at New Bedford, Mass., to be erected by the State. It is announced that the Standard Arcade, 600 tons, has been definitely postponed as well as the purchase of 600 tons of plates for car floats for the Lehigh Valley. In the week the American Bridge Company has secured contracts for a union passenger station, 200 tons, at Burlington, Vt.; two bridges for the Pennsylvania Railroad, 250 tons, and several buildings for the Du Pont Powder Company at City Point, Va., calling for 800 tons. The Park Iron Works will furnish 400 tons for 11 six-story apartments at 160th street and Riverside drive, while the Phoenix Bridge Company is to furnish 200 tons for a dumping board for the city of New York. In iron bars more activity has been displayed in the past week and consumers are reported as particularly interested in covering their needs for the first quarter at present prices. Considerable interest in contracting for steel bars, plates and shapes is reported, but there is lack of enthusiasm on the part of producers to commit themselves extendedly except at some advance over present low prices. This is retarding active buying for future needs though some satisfactory deals have gone through. We quote mill shipments of steel bars, shapes and plates at 1.10c. to 1.15c., Pittsburgh, or 1.26c. to 1.31c., New York, and iron bars at 1.20c. to 1.25c., New York. For lots from store we quote iron and steel bars at 1.80c. to 1.85c., New York, and plate and structural material at 1.85c. to 1.90c.

Boston

BOSTON, MASS., December 8, 1914.

Old Material.—The opinion that conditions are improving is the general sentiment in the trade, in spite of the fact that buying has fallen off, because of approaching inventories. Prices remain unchanged, but are wholly nominal. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$7.00 to	$7.75
Low phosphorus steel	13.75 to	14.75
Old steel axles	12.75 to	13.25
Old iron axles	20.25 to	20.75
Mixed shafting	12.00 to	12.25
No. 1 wrought and soft steel	8.25 to	8.75
Skeleton (bundled)	5.50 to	5.75
Wrought-iron pipe	7.00 to	7.50
Cotton ties (bundled)	5.25 to	5.75
No. 2 light	3.25 to	3.75
Wrought turnings	5.00 to	5.50
Cast borings	5.00 to	5.25
Machinery cast	10.75 to	11.00
Malleable	7.50 to	7.75
Stove plate	7.00 to	7.50
Grate bars	5.25 to	5.50

British Trade More Active

Business Tone Good—Better Steel Rail Prospects —Ferro Export Permits Refused

(*By Cable*)

LONDON, ENGLAND, December 9, 1914.

Pig iron is more active and the tone of business is pretty good, but exports are restricted. The general feeling is quite confident and the advance in ore is an important factor. Furnaces active in the three districts are 163, against 177 at the same time last year. Stocks of pig iron in Connal's stores are 106,618 tons against 106,514 tons last week. The position of ferromanganese is colorless. Export permits for New York have been refused. The tin-plate trade is affected by export prohibitions, but some permits are now being granted to Denmark, Holland and Sweden. In the rail trade prospects are better. Queensland is inquiring for 20,000 tons and Denmark for 10,000. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 6d. ($3.04).

Cleveland pig-iron warrants (Tuesday), 51s. 7½d. ($12.56), against 52s. ($12.66) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 52s ($12.66), against 52s. 6d. ($12.78) last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 10s. ($41.36).

Steel ship plates, Scotch, delivered local yards, £6 15s. ($32.84).

Steel rails, export, f.o.b. works port, £6 5s. ($30.41), against £6 2s. 6d. ($29.80) last week.

Hematite pig iron, f.o.b. Tees, 67s. 6d. ($16.42), against 65s. ($15.82) last week.

Sheet bars (Welsh), delivered at works in Swansea Valley, £4 17s. 6d. ($23.72).

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £6 10s. ($31.62), against £6 5s. ($30.41) last week.

Steel bars, export, f.o.b. Clyde, £7 ($34.06).

Metal Market

NEW YORK, December 8, 1914.

The Week's Prices

Cents Per Pound for Early delivery

	Copper, New York			Lead		Spelter	
Dec.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
2	13.00	12.75	33.12½	3.80	3.67½	5.40	5.25
3	13.00	12.75	33.25	3.80	3.67½	5.45	5.30
4	13.00	12.75	33.60	3.80	3.67½	5.50	5.35
5	13.00	12.75	33.50	3.80	3.67½	5.60	5.45
7	13.00	12.75	32.75	3.80	3.67½	5.65	5.50
8	13.00	12.75	32.50	3.80	3.67½	5.65	5.50

Copper is quiet and quotations are practically unchanged. The demand for tin is light and the price is lower. Lead is dull at unchanged quotations. Spelter is higher as a result of export sales and inquiries. Antimony is weaker.

New York

Copper.—The market has been quiet despite reports that a large business was done in electrolytic at 13c., full terms. The trade concedes that there was heavy buying up to the time 12.75c., cash, was reached, but does not credit the rumors of sales at the higher figure. First-hand sellers made an effort to establish a higher level at 13c., full terms, in the latter part of last week, but failed to get business and on Monday their quotation was dropped to 12.87½c., full terms. Throughout the week second hands were willing to sell copper at 12.75c., cash, New York. The quantity they had to sell was not large, but nevertheless it was sufficient to make the market. Lake copper has been quiet except for purchasing by a few ammunition makers. It is obtainable at 13c., though some grades have sold recently at 13.12½c. and 13.25c. For future deliveries of copper about ¼c. premium is asked. Government figures of exports, 30 days old, are now being issued day by day.

Copper Averages.—The average price for Lake copper for the month of November, based on daily quotations in *The Iron Age*, was 12c., and for electrolytic copper, 11.84c.

Tin.—There was only one active day in the week, Saturday, when between 150 and 200 tons was traded in, all for future delivery. Spot stocks are not large and are concentrated in a few hands and should a noteworthy demand develop the market would quickly respond and go to a higher level. The announcement of the 1915 price of tin plate at $3.20 per base box, Pittsburgh, caused some members of the trade to believe that a large demand for pig tin would result at once, but in this they were disappointed. The arrivals this month total 185 tons and there is afloat 1920 tons. The New York quotation yesterday was 32.50c.

Lead.—This metal has been quiet but steady throughout the week at unchanged quotations, that at New York being 3.80c. and that at St. Louis, 3.67½c. Consumers are well supplied.

Spelter.—Continued inquiry from abroad and what is believed to be a good volume of exports, although these are a matter of conjecture until the appearance of Government figures, are held accountable for a steady advance in spelter which was quoted yesterday at 5.65c., New York, and 5.50c., St. Louis. It is believed that stocks have been reduced and that the smelters are now in a comfortable position.

Antimony.—The market is weaker at prices which are more or less unstable. The demand is quiet from both domestic and foreign consumers. Cookson's is quoted at 16c., Hallett's at 15c. and Chinese at 13.50c. to 14c.

Old Metals.—The market continues quiet. Dealers' selling prices are unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	12.00 to 12.25
Copper, heavy and wire	11.50 to 11.75
Copper, light and bottoms	10.50 to 10.75
Brass, heavy	8.75 to 9.00
Brass, light	6.75 to 7.00
Heavy machine composition	11.00 to 11.25
Clean brass turnings	8.00 to 8.25
Composition turnings	9.25 to 9.50
Lead, heavy	3.55
Lead, tea	3.30
Zinc, scrap	4.00

Chicago

DECEMBER 7.—In non-ferrous metals, no general advance in strength has been attained, although quotations for Lake copper are approximately ⅛c. higher. Tin and lead prices are lower. With the exception of a slight recession within the past day or two, spelter quotations have steadily advanced. The demand for antimony has been quite sharp, largely for export. We have revised quotations as follows: Casting copper, 12.75c.; Lake copper, 13.12½c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 33.50c.; small lots, 36.50c.; lead, desilverized, 3.75c., and corroding, 4c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.50c.; Cookson's antimony, 18c. to 20c., for cask lots; other grades, 17c. to 18c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 10.50c.; copper bottoms, 9c.; copper clips, 10c.; red brass, 9.50c.; yellow brass, 7c.; lead pipe, 3c.; zinc, 3.50c.; pewter, No. 1, 24c.; tinfoil, 28c.; block tin pipe, 28c.

St. Louis

DECEMBER 7.—The market for lead and spelter has shown wide variance in tenor and movement, the former weakening, while the latter is stronger. Lead closed only fairly steady at 3.67½c. bid and 3.70c. asked. Spelter closed strong at 5.30c. bid and 5.40c. asked with relatively small transactions. Tin is quoted at 36c.; Lake copper, 13.50c.; electrolytic, 13.40c.; Cookson's antimony, 16c. In the Joplin ore market zinc blende showed advances, especially in the lower grades. The basis range for 60 per cent. was $43 to $46.50 per ton, with choicest lots $49 to $49.50. Calamine was stronger at $21 to $23 and top settlements as high as $28. Lead ore was strong at $47, with best grades $1 and $2 more. Production is rapidly increasing. Miscellaneous scrap metals are quoted as follows: Light brass, 5c.; heavy yellow brass, 7c.; heavy red brass and light copper, 8c.; heavy copper and copper wire, 9c.; zinc, 3c.; pewter, 20c.; tinfoil, 24c.; lead, 3c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, December 9, 1914.

As trading in bonds has developed no flood of liquidation, and general financial conditions are propitious, the New York Stock Exchange will resume trading in stocks on the coming Saturday. This will be done under certain restrictions. Business will be confined for the immediate future to 180 stocks out of the 565 issues on the board, and a minimum price will be named on each. Among the industrial stocks for which trading will thus be thrown open are Allis-Chalmers, American Can, American Car & Foundry, American Smelting & Refining, American Smelting Securities, Bethlehem Steel, Continental Can, General Electric, International Harvester of New Jersey, International Steam Pump, National Lead, National Enameling & Stamping, Pittsburgh Coal, Railway Steel Spring, Republic Iron & Steel, Rumely, Sloss-Sheffield, United States Cast Iron Pipe and Westinghouse Electric. It will be observed that United States Steel is omitted from the list, this being probably due to the fear that large foreign holdings might be thrown on the market. Even though the trading in stocks will be restricted, an important step will thus be taken in progress toward the deliverance of the business and financial situation from the shackles imposed by the European war.

Dividends

The American Steel Foundries, regular quarterly, ½ of 1 per cent., payable December 31.

The Baldwin Locomotive Works, regular semi-annual, 3½ per cent. on the preferred and 1 per cent. on the common stock, payable January 1.

The American Can Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 1.

The Canadian General Electric Company, regular quarterly, 1¾ per cent., payable January 1.

The American Car & Foundry Company, regular quarterly, 1¾ per cent. on the preferred stock and ½

of 1 per cent. on the common stock, payable January 1.

The Canadian Westinghouse Company, Ltd., regular quarterly, 1¾ per cent., payable January 11.

The Ingersoll-Rand Company, regular semi-annual, 3 per cent. on the preferred stock, payable January 2.

The Pettibone-Mulliken Company, regular quarterly, 1¾ per cent. on first and second preferred stock, payable January 2.

Philadelphia Foundrymen's Association

A large number of members attended the monthly meeting of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club, Philadelphia, December 2. James Wood Pogue, vice-president of the Sheldon School of Business Science, made an interesting address on "Human Nature and How to Read It," having reference particularly to the relation of character reading to successful salesmanship. At the business session of the association routine matters were considered. The annual election of officers for which nominations were made at the November meeting, will be held in January.

In the balance sheet of the Ford Motor Company as of September 30 one item in particular is illuminating as regards the business philosophy of this company. Under assets the item of Patents is listed at $59,767, and under liabilities the same amount appears as a "reserve for depreciation of patents." The balance sheet shows assets in cash of $27,441,468; merchandise, $9,284,449; buildings and building fixtures, $10,714,928; machinery and power plant, $3,821,465 and accounts receivable, $3,233,582. Accounts payable are, $3,335,139; reserve buyers' profit sharing, $2,557,080; reserve for depreciation of fixed assets, $1,935,440; surplus, $48,827,032.

The Factory Power Company, Oakley, Cincinnati, Ohio, recently won a suit of much interest to corporations of its kind. The company is owned and operated jointly by the manufacturing plants comprising the Oakley Colony Company. Suit was instituted against the company by the State of Ohio in an endeavor to enforce a tax on the ground that it was a public service corporation. The decision handed down in the Common Pleas Court of Franklin County, Ohio, rules that the company is a private corporation and that the State cannot collect the excise taxes.

A company has been organized to carry on the business of W. A. Reddick, Niles, Mich., whose factory was destroyed by fire November 17. This company has taken over Mr. Reddick's business, together with good will, patents, etc., and has started operations in a large building near the old site and machinery is being installed at the present time. B. H. Smith, who has been superintendent of the Reddick factory for the past 13 years, up to and including the time of the fire, is manager of the new company, which will manufacture hardware specialties.

Some idea of the wealth of published material relating to oxy-acetylene welding may be gathered from a 34-page pamphlet that has been issued by the New York Public Library. This contains a list of works on this subject that may be found in the library. The arrangement is chronological by date of publication from 1893 to October of the present year, and contains a list of 487 books, pamphlets, magazine articles, etc. An index which is arranged by subjects and authors is included.

The Cincinnati office of the C & C Electric & Mfg. Company, which is in charge of F. A. Saylor, has been removed to 217 West Second street, from its former quarters in the Greenwood Building. This change of location has provided more space and will permit the carrying of a comparatively large stock of material, so that shipments can be made directly to the territory covered, instead of having to wait for material to arrive from the factory at Garwood, N. J.

Chrome and Magnesia Brick by Weight

Announcement is made by the Harbison-Walker Refractories Company that it has established for its chrome and magnesia brick one standard measuring 9 x 4½ x 2½ in., and that beginning January 1 quotations on these two classes of brick, whether standard sizes or special shapes, will be on a tonnage basis. Heretofore there have been deviations from the size above named, in some instances brick measuring 8¾ x 4⅜ x 2⅜ having been made. The purchases have been both by tonnage and at a price per thousand. The above company has sent out its schedule of extras for chrome and magnesia brick, which shows that for arch, wedge and key brick the charge is $5 over the base price, and for soaps and splits and feather edge, $15 above the base per net ton. Special shapes are divided into two classes. Class A, which are rectangular shapes not exceeding 15 x 6 x 4 in. or less than 8 in. in length, 4 in. in width or 2½ in. in thickness, in lots of 1000 pieces or more, carry an extra of $5 per net ton. For Class B, rectangular shapes from 15 to 18 in. in length, 4 to 6 in. in width and 2 to 4 in. in thickness, the extra is $8. The company's view is that quoting a tonnage price throughout will not only avoid confusion but assure fairness, slight variations in size automatically adjusting themselves equitably to buyer and seller. The price of keys, wedges, etc., is not necessarily raised by the system of extras, as their weight is considerably less than that of straight brick. The extra for soaps, splits, etc., makes their cost actually less than when purchased at a price per thousand pieces uniform with 9 in. straight brick. The new method also establishes definitely in the calculations of engineers the relative cost of various types of design.

Pittsburgh Foundrymen's Association

A paper entitled "Castings in the Production of Electrical Apparatus" was read by A. B. Reynders, director of production of the Westinghouse Electric & Mfg. Company, at a meeting of the Pittsburgh Foundrymen's Association on the evening of December 7. After pointing out the reasons for the extensive use of iron and steel in electrical apparatus, the paper describes the progress that has been made since the early days of the electrical industry when cast iron was employed very largely. Some suggestions as to the lines along which foundrymen should work to improve their product and thus check the decreasing use of castings are included. Cryle Fox, Pittsburgh representative of the Cortland Carborundum Company, Cortland, N. Y., was elected an associate member. It was voted to change the meeting night of the association from the first to the third Monday of each month, so that the next meeting will be held January 18, 1915.

The Railway Materials Company, Stevens Point, Wis., is now turning out daily 800 brake shoes for cars and locomotives. The foundry was put in operation November 18. S. F. Hebden, who had charge of the remodeling of the old Wisconsin Central car shops for this purpose, has returned to Chicago, and the plant is now in charge of J. E. Hyatt, as general manager and factory superintendent.

A French firm which for 30 years has represented various German manufacturers of machine tools, rolling mill and forging machinery, and which handled last year approximately $200,000 worth of German machinery, advises *The Iron Age* that it will now undertake the representation in France of American manufacturers in these lines.

The Peninsular Stove Company, Detroit, Mich., is about to increase its capacity by an addition to its present buildings, which will cost $225,000. James M. Dwyer, vice-president and general manager, says the improvement will give the company 2,275,000 sq. ft., a greater area than occupied by any other stove concern.

PERSONAL

Elbert H. Gary has accepted the chairmanship of a committee of 79 business men and others appointed by Mayor Mitchel to handle the problem of unemployment in New York City. Mayor Mitchel asked that the committee consider how by co-operation unemployment may be minimized, also that it make plans for raising money for relief work.

Charles M. Schwab and Archibald Johnston, of the Bethlehem Steel Corporation, sailed for Europe on the Lusitania on Saturday, December 5, and will probably return before the end of the month.

Edward N. Hurley was elected president of the Illinois Manufacturers' Association at the annual dinner held at the Congress Hotel, Chicago, December 8.

President James A. Farrell, of the Steel Corporation, was a speaker this week at the dedication of a new high school building at Farrell, Pa., which will be known as the James A. Farrell School.

Frank Cordes has resigned as president of the Best Mfg. Company, Oakmont, Pa., to become president and general manager of the Hubbard Steel Foundry Company, East Chicago, Ind., maker of rolls and rolling-mill castings.

A. C. Cook, sales manager of the Warner & Swasey Company, Cleveland, Ohio, sailed for England December 5. He will spend about two months in that country and will probably also visit France.

G. P. Blackiston, advertising manager of the Berger Mfg. Company and the Stark Rolling Mill Company, Canton, Ohio, for the past five years, tendered his resignation December 1 and will devote his entire attention to the Advertising Laboratories, Canton.

Stanley Wenger, for the past eight years associated with the Green Engineering Company in the sales department at Chicago, has been appointed special sales representative at Chicago for the Prest-O-Lite Company. He will specialize in the sale of welding equipment for large industrial operations.

James C. Peil, foundry foreman of the South works of the J. I. Case Machine Company, Racine, Wis., has resigned to accept the position of foundry superintendent of the Maxwell Motor Car Company at Dayton, Ohio.

Frank F. Jackson, vice-president of the Lakeside Bridge & Steel Company, Milwaukee, and O. G. Henderson, have formed a partnership, under the name of Jackson & Henderson, to engage in the business of structural steel erection. Mr. Jackson will continue as vice-president with the Lakeside Bridge & Steel Company.

A. E. Seelig has been appointed general sales manager of the Kerr Turbine Company, Wellsville, N. Y. He formerly held a similar position for several years with the L. J. Wing Mfg. Company and recently was manager of the new machine-tool department in the New York office of Schuchardt & Schutte.

John A. Hense, formerly with the National Malleable Castings Company, Chicago, and later with the Dravo-Doyle Company, Philadelphia, has been appointed St. Louis representative of the Kerr Turbine Company.

L. M. Waite, Fitchburg Machine Works, Fitchburg, Mass., sailed for Europe December 5 in connection with the business of his company.

The resignation of Dr. David T. Day from the United States Geological Survey is announced. He has opened an office as a consulting engineer at 1331 F street, N. W., Washington, D. C.

F. L. Bunton has severed his connection with the Heine Safety Boiler Company and has become manager of the Chicago office of the Goulds Mfg. Company, manufacturer of pumps and hydraulic machinery, his new office being located at 3801 South Ashland avenue. He was manager of the Chicago office of the Heine Boiler Company for two and one-half years and for eight years previous managed the Philadelphia and St. Louis offices of the Allis-Chalmers Mfg. Company.

C. H. Stand has accepted a position as metallurgist for the Crown Cork & Seal Company, Baltimore, Md.

L. Selmi has become chief chemist for the Otis Steel Company, Cleveland, Ohio.

C. W. Shepard has been appointed general superintendent of North works, Illinois Steel Company, succeeding William H. Pratt, deceased. He had been assistant superintendent up to the time of Mr. Pratt's death.

Fore River Submarine Contracts Reported Canceled

Charles M. Schwab conferred with Secretary Bryan of the State Department in Washington last week in answer to the department's inquiries concerning business placed in this country by governments which are at war. The reported taking of contracts for the building of submarines by the Fore River Shipbuilding Company for the British navy raised the question whether such contracts could be executed in the United States even though the work consisted in building submarine parts and sending them separately to Europe for assembly. A Washington dispatch of December 7 says:

Formal announcement was made by Secretary Bryan today that Charles M. Schwab had given up his plans to have the Fore River Shipbuilding Company construct a fleet of submarines for one of the belligerents. It was acknowledged officially that Mr. Schwab had been advised by eminent international lawyers, whom he had employed as counsel, that legally it was permissible for the Fore River Company to build submarines in parts and ship them in sections to Europe. Mr. Schwab's voluntary assurance came shortly before he sailed for Europe a day or two ago and it is apparent now that his trip has to do with the cancellation of the contract.

American Interest in Bridge Reconstruction Already Planned in France

C. H. McCullough, Jr., vice-president and general manager of the Lackawanna Steel Company, Buffalo, sailed from New York on the Lusitania, December 3. While abroad he will canvass the steel requirements for extensive reconstruction of bridges in France destroyed by the war. The French government has recently started negotiations for the rebuilding of many bridges, the matter having been taken up with a New York contracting firm, the Holbrook, Cabot & Rollins Corporation, and A. B. Adams, contractor, New York. Also sailing on the Lusitania were Frederick Holbrook, vice-president, and William S. Patten, secretary of the Holbrook, Cabot & Rollins Corporation, Mr. Adams, and an engineer representing the Lackawanna Bridge Company.

The Cleveland Railway Supply Company, Citizens Building, Cleveland, is placing on the market a new line of locomotive cranes ranging in capacity from 15 to 30 tons, inclusive. This company has recently taken the sales agency for the products of the Thew Shovel Company, E. Lorain, Ohio, and of the Lakewood Engineering Company for the Canadian territory east of Winnipeg.

Orders recently taken by the Concrete Steel Company, Youngstown, Ohio, include among others the Ford Motor Company's building at Cleveland, 600 tons; Columbus Athletic Club's building, Columbus, Ohio, 200 tons; high school building at Lorain, Ohio, Ohio, 300 tons; Miami Hotel at Dayton, Ohio, 200 tons.

The Shaw Coupling Company, Syracuse, N. Y., announces that, effective December 1, the Oneida Steel Pulley Company, Oneida, N. Y., and its auxiliary, the Keystone Pulley Company, were made the exclusive selling agents for the complete line of Shaw couplings.

Blast furnace G of the Bethlehem Steel Company, South Bethlehem, Pa., was blown out for relining this week after a campaign of more than two years.

Labor Problems in Scientific Management

A New Profession and a Larger View of the Employment Manager—Meeting of the Society to Promote the Science of Management

A new profession involving a new attitude toward the industrial organization has been established. It was explained at length in New York on Saturday morning, December 5, at a meeting of the Society to Promote the Science of Management. Robert G. Valentine, himself practising the new profession, with an office in Boston, Mass., made the presentation. His address had to do with what he calls the industrial counselor and covered also the possible relations of scientific management and labor unions. With admitted pro-union sympathies, he succeeded in his expectations which, as he announced at the outset, were not to convince his audience, which he regarded as semi-hostile, and also not to repel it by a stand which might be thought as exceedingly radical. His address was delivered extemporaneously and the report below is from notes taken at the time and therefore not necessarily in the exact language of the speaker.

The society held its annual meeting at the time and devoted itself to the questions of labor in management. The first session was held on Friday evening, December 4, and current wage theories were discussed with an introduction by a paper by Prof. Chester A. Phillips, assistant professor of economics of Dartmouth College. The business session was held on Saturday morning followed by Mr. Valentine's address. In the afternoon an address was made by Ernest M. Hopkins, supervisor of personnel, Curtis Publishing Company, Philadelphia, on "The Function of the Supervisor of Personnel," and in the evening was a round-table discussion on systems of wage payment opened by Prof. Charles W. Mixter on "A Proposed Modification of Task and Bonus." The meetings were well attended, particularly so in view of the fact that the organization itself is not a large one. In the following is given a report of the addresses by Mr. Valentine and Mr. Hopkins with the discussions ensuing, leaving for a later issue such attention as may be possible to other features of the programme.

The officers of the society are as follows:

President: Dr. Harlow S. Person, director Tuck School of Administration and Finance, Dartmouth College, Hanover, N. H.

Vice-presidents: Morris L. Cooke, director of public works, Philadelphia, and Charles Day, Day & Zimmerman, Philadelphia.

Secretary: Robert T. Kent, 64 Orange Road, Montclair, N. J.

Treasurer: H. K. Hathaway, Tabor Mfg. Company, Philadelphia.

Members of governing board: Arthur E. Barter, Plimpton Press, Norwood, Mass., and Sanford E. Thompson, consulting engineer, Boston, Mass.

Membership committee: H. V. R. Scheel, Brighton Mills, Passaic, N. J.; C. N. Lauer, Day & Zimmerman, Philadelphia; Morris L. Cooke, Philadelphia; Carl G. Barth, Philadelphia; John H. Williams, and Prof. C. Bertrand Thompson, Harvard University.

The Industrial Counselor and the Industrial Audit

By way of introduction, Mr. Valentine in his address referred to, explained that he had been for two years engaged in the business of industrial counselor, and in that time had 31 different jobs in 16 different industries, a point which he wished to make to indicate that his ideas were meeting approval to the extent at least that he was successful in being retained for money considerations. It may be said in passing that Mr. Valentine was at one time identified with the instructing staff of the Massachusetts Institute of Technology and latterly was commissioner of Indian affairs of the United States Government.

THE IDEA OF INDUSTRIAL SOLVENCY

He believes in the principles of scientific management, "as I understand them," he said, and that each individual must have every opportunity to bring out what is best in him, and he believes in the trade union, owing to its democratic hypothesis. The important point regarding his attitude toward industry is that an industrial establishment must be "industrially solvent." The day is not far distant, he argued, when bankers will demand a certificate of industrial health in addition to certificates of financial stability and certificates attesting to satisfactory buildings and equipment. He suggested that such a certificate would read something like the following: "We have investigated the condition of the XYZ Company, first, as to the fundamental, social forces at work; second, as to the personnel of the factory, covering the methods of selection and the development of the workers; third, as to rates of wages and the methods of proportioning them; fourth, as to the attitude toward labor unions, and fifth, as to the company's attitude toward labor laws and safety, sanitation, health and the regularity of employment; and we find that the company is giving considerable attention to human relations and is not carrying a heavy burden of dissatisfaction costs." In making an industrial audit, as he would style it, he would first take up the task of analyzing the organization, and if, for example, nothing was done toward promoting self-government among the employees, he would grant no certificate against labor troubles.

THE PERSONNEL PARTNER OF A BUSINESS

He emphasized that it is necessary to lift the employment department to the level of the manufacturing, accounting and other similarly important departments of the business and to put it perhaps in the hands of a partner of the business. He argued that it is a cardinal point of business administration to keep pay and patronage apart.

The manufacturer must be alive to the meaning of trade unionism, distinguishing between the constructive meaning and destructive meanness. The manager of a business should be alive to all the movements going on about him, as they affect business to a greater or less extent. He must be alive to the growth of co-operative movements, the backwardness of our educational system despite its successes; he must be alive to such influences as the suffrage question. They all affect business and are not more varied than are the problems faced in other departments of the business, but they are more subtle. The field appears big and complex, but one ought to try to ascertain the effect of sociological changes.

It is not an answer to say that the concern cannot afford a personnel partner. It can just as well do so as it can afford a works manager. If the business is small there is nothing, Mr. Valentine emphasized, more profitable than for the owner to give attention to these matters himself. Above all he must discover what are the fruitful sources of his own supply of labor, which he should develop. Foremen should be teachers, not bosses; are the jobs properly explained for the men, and do the workers feel that they are a part of the business? Is the system of payment becoming a modification of the profit and loss partnership? Does the manager deal with the labor organization on the defensive or from a constructive standpoint? Does he enter the fight in relation to new labor laws? Those which

have been placed on the statute books, at least the bulk of them, Mr. Valentine holds, are the work of timid politicians and stupid philanthropists, because manufacturers have not sensibly organized to prevent the legislation.

The development of the technique of the industrial audit is in its infancy. The present organization chart shows oblongs of duties and responsibilities, but is impersonal, while in the new idea people appear by name. There is a great drift of the democratic idea which, he said, will crush scientific operations in industry unless they are recognized as the ideal. Science is the disciple of democracy and democracy is the purpose of science. The way to get facts and to train men and women to work does not come within the purview of lawyers, who have no grounding in industrial questions, and the courts are not the arena for considering labor disputes. There is therefore a big place for the industrial counselor, one who is a master in the growing laws of industry and who will find himself in a new professional field which will at one and the same time give him an honorable living and allow him to perform a public duty. There is no justifiable service which is not for the public as well as for the employee and employer.

Considering Labor First in Establishing a Plant

In Mr. Valentine's remarks concerning the relations of scientific management and labor unions, he approached the question from the standpoint of a new plant which is about to be established. Ordinarily the idea is to ascertain the size of plant and equipment necessary, then to consider the processes and methods of management and finally assume that it is relatively easy to pick up the labor required. His idea is that the first necessity is to study the labor supply, and he would confer at the outset with labor leaders. Then, so far as the union is concerned, he would run a preferential shop, taking men first from the unions. Then before a spade is put into the ground, he would establish the union wage as a base. He would insist on installing a minimum wage. Admitting the possibility of a depression in business and the company could not maintain the wages, he would declare the concern industrially insolvent, just as it would be if it defaulted on paying the interest on bonds. He considers that the minute a manufacturing establishment ceases to be able to pay what a man has counted on, it is industrially insolvent.

He would plan his work as far as possible for regularity of employment. He would also early provide for some sort of co-operation of employers among the industries. He would advocate that the manufacturers in a given community should see to it that demands for labor for public work should not be made at the wrong time, and cited the instance of the city of Duluth, which determined on the building of miles of ditches in cold weather when there was a maximum supply of labor and when it could be thus obtained cheaply.

After providing for these stabilizing conditions by the co-operative understanding among employers, then, as the last in the preliminaries, he would work to build up a thorough going shop organization, aiming at training the workers in citizenship as something they can only get in group organizations. Single employers, he said can at least do what is possible in this direction, and the suggestion, he asserted, is not theoretical.

Then on the side of production, he dwelt on the fact that it is wrong to develop selling so that it does not give a steady inflow of demand on the works. After perfecting the selling organization, planning the work should be done even before taking up motion and time studies.

He would then consider the rights of the consumer, which involve that there is no watered stock in the company; that there are sanitary conditions surrounding the manufacture of the product; that there are no hidden salaries, for example, affecting the stability and honesty of the organization. One fundamental trouble, he said, is that too many feel that unit cost is a fight between the employee and the employer.

Above all, he feels that after dealing with the union, along the lines suggested, one can get by the union every single thing that the majority considers legitimate or essential in scientific management, because the whole basis of the relation is shifted from one of violence to one of constructive activity. Scientific management, he said, is bound to stay, just as has machinery.

The Discussion

H. P. Kendall, Plimpton Press, Norwood, Mass., in the discussion, referred to the suggestions of Mr. Valentine as revolutionary. He agreed that the matter of lifting the employment department to a level of sales department, for example, is a situation which is coming, and admitted that too little attention has been given to the question. It is the seat of a lot of grievance, he said, but it is difficult to get the desirable man, let alone putting him on the basis of equality with other important department headships. He admitted also that industry has got to organize to affect a seasonal employment scheme. He admitted also that the hypothesis of democracy and industry is correct; that the individual plant is powerless in making its impression on changes in factory laws, in matters of workmen's compensation, and in labor troubles, for example. Manufacturers have much to fear in communities with the closed shop, and it is sometimes difficult to distinguish between the ward boss and the labor leader, and it is not hard to believe that a new industry in a given town might find it difficult to start under such conditions. There are also such drawbacks as the influences which control labor locally, such as the national union or affiliated unions differing from the local.

Prof. C. B. Thompson, Harvard University, asked how one, getting the acceptance of the labor union, could meet the policy of unionized labor to maintain the restriction of output and equalization of wage, as these policies are in practice followed. Collective bargaining must provide for the enforcement of means of establishing the day's work and the application of the bonus payment. Mr. Valentine replied that he knew of three unions which are definitely co-operating with manufacturers in increasing the output and in allowing for differentiation in wages. The real answer, he said, is that the whole basis of the struggle is changed when the manufacturer affirms the union idea.

Prof. William Kent congratulated Mr. Valentine on his paper and on the number of jobs that he had secured in the year or two in which he had been practicing as industrial counselor. He thought that it was interesting that there are manufacturers who admit that they do not know it all and call in an advisor. Mr. Valentine explained that he had been occupied since January with his largest job and within the two years suggested by Professor Kent he hoped to bring before the society the specific results of his work in this particular case. He admitted in answer to another question that in establishing a union shop there is a tendency toward maintaining a closed shop, but that by taking such an attitude the manufacturer makes an educational point that he will go outside if he cannot get the satisfactory men and that in the end the manufacturer is in a better position. He advocated the arrangement at the outset with the union of a level wage, if by that means he was able to secure group action by the union, and then after accomplishing desired conditions in manufacturing, he would explain how the level wage is the worst possible economically.

Robert T. Kent advocated that unions take up education before co-operation and he himself had suggested some years ago that unions attempt to rate their own men and give colored cards accordingly. Some four years ago he noticed that the brass workers' union in England had so rated its members on a basis of an examination before the joint board of manufacturers, employees and independent individuals.

Sanford E. Thompson, Boston, stated that the same idea was followed by the stone setters' union, but there had been a number of strikes even with this plan in operation. He mentioned that before a meeting at the Western Economic Association a labor leader expressed a belief in science in management and the elimination

of unnecessary operations. He said that unions way down deep in their belief fear that there is not enough work to go around unless the work is done slowly.

THE GUARANTEED WEEKLY MINIMUM WAGE

Henry Noyes, German-American Button Company, Rochester, N. Y., agreed that the assertion of Mr. Valentine that there should be a guarantee to employees of a weekly minimum wage was theoretically fine, but with the industries working at the extremely low percentage of capacity which is now the case, owing to conditions which could hardly be foreseen, it was easy to figure that a sound concern could in one month lose in paying a weekly wage minimum to its employees an amount that would exceed the amount of the interest on bonded debt and preferred dividends for one year. Employers should have the alternative of reducing the force or running on short time, besides facing the loss due to the burden which must be carried.

Mr. Valentine explained that he had the chairmanship of the first wage board of Massachusetts on the minimum wage question and he did not want to appear to retreat from the stand he has taken, but called attention to a modifying clause which he had mentioned of "a carefully guarded weekly minimum." He preferred to look at the minimum wage as a retaining fee. It follows that the employee need not be retained indefinitely anymore than a consultant in some professional line would be. He added that the Massachusetts board can reconsider the minimum rate question when conditions warrant. He asserted also that the American Federation of Labor has not made any intelligent study of scientific management, but he could get scientific management by Samuel Gompers if Mr. Gompers were a worker in the shop.

Prof. R. F. Hoxie, who is representing the Federal Commission on Industrial Relations, in investigating the relations between union labor and scientific management, brought the meeting to a close, on request of President Dr. Person. One fundamental difficulty, he said, is that scientific management knows nothing of labor unions and labor unions know nothing of scientific management, and yet each group collects and attempts to instruct about the other. He emphasized that the unionist does not believe in restriction of output, although he does in practice attempt it. He suggested that the Society to Promote the Science of Management change its constitution to admit the unionists into membership. He asserted that the American Federation of Labor is officially on record as not opposed to science in management and has advocated saving wastes and cultivating improvement in the various methods of manufacture.

Function of the Supervisor of Personnel

Mr. Hopkins in his address explained that the supervisor of personnel does from the inside of the plant what Mr. Valentine does from the outside. He felt that future developments will show both types are required. The management may occasionally require auditing from the outside.

It is natural, he said by way of introduction, that with the increase in the use of machinery and the centralization of power, attention should have been paid to machinery and then to plant, but now the individual worker has come into his own. Department heads should not choose their employees The man who is developing the routing of work is not necessarily capable of choosing the worker. There should be the same scientific attitude in the study of men as there is in the purchase of machinery. Moreover, the man in charge of employment should act as counsel to the employees.

As indicating the waste in employment, he mentioned an electrical company employing 30,000 employees, which in adding some 12,000 employees received applications from 186,000 and interviewed 36,000. In another case where 400 sales girls were added to the force, some 3500 were tried out. He emphasized that an employee of six months' standing is better than one without any, and yet the manufacturer lets employees go without any means being taken to keep track of them so that they may be obtained again when needed.

THE EMPLOYMENT MANAGER A POSITION OF RANK

The employment manager, he considers, should rank with other managers of the plant. Such a man would want to report to the general manager. The employment office is in the position of a service department, and a fund should be established for selecting employees. The employment manager is in fact in the position to some extent as the endorser of a note. He should therefore be able to express opinions on discharging employees or transferring them. Notwithstanding, many manufacturers think that the employment manager should have no further word after deciding on the applicant.

In the welfare side of the problem, the object should be to restore to the individual what he enjoyed when he was working as an individual in former times. Though he may doubtless be in a better position than when the individual worker was the unit, then one retained enthusiasm and loyalty. When, instead of this, employees are admitted to a large plant day after day in large groups and then must reach their working floor, for example, by means of elevators of insufficient capacity, so that they must arrive at the plant unusually early, there is the impression of lack of regard for their convenience, and even a lack of attention to hazards. They easily get the impression that there is nothing beyond the day's wage, and soon espouse the new ideas that are rampant. Provisions for safety, sanitation and fire protection show that the manufacturer is providing things for the individual. Welfare for outside show is no good. Insufficient locker-room and check-room accommodations give also impressions of crowding, and these should be supplied before luxuries in welfare work, such as paintings, concerts and lecture courses are provided. In short, the welfare arrangement should not be for the satisfaction of the owners, but should be based on a belief of the owners that employees have rights to life, health and happiness.

RECOGNIZING FATIGUE AMONG THE WORKERS

He mentioned how in the Curtis plant it was discovered that there is a fatigue element manifesting itself toward each week end. It is regarded as of sufficient importance to close the plant all day Saturday as well as Sunday. It appears that as much work is done in the 5 days as was in 5½, with added satisfaction among the employees by the provision of the extra holiday.

Mr. Hopkins believes health examinations on prospective employees is an absolute necessity. He has found a rapid decline in tuberculosis, and while modern conditions of light and cleanliness in factories have their influence, he considers that the careful selection of employees has been largely responsible for the rapid decline in the prevalence of tuberculosis. He is not sure that health examinations should be attempted of themselves, but they are of an advantage where a mutual insurance scheme is put into force in the works, which scheme he favors.

The Discussion

Morris L. Cooke opened the discussion. He regarded compulsory physical examination of employees as brutal, but if it is voluntary, it will be found, as in one case that he cited, that 95 to 98 per cent. are willing. An active discussion followed, but nothing specific was brought out as to methods of selecting employees, although Mr. Hopkins has found within narrow applications that some of the tests of Professor Münsterberg, of Harvard University, are satisfactory.

PHYSICAL EXAMINATION OF EMPLOYEES

Some of the opposition to physical examinations arose, it appears, out of the belief that the company's physician plays the part of a spy on employees, and this was true also in some cases of the factory nurse.

Mr. Hopkins stated that the reason for rejection on physiological grounds was given to the applicant by the doctor, and often advice for treatment.

Mr. Noyes explained how his company started the physical examination of old employees 2½ years ago, and 77 per cent. were examined. A year ago the examinations were repeated and were made exceedingly thorough, about ½ hr. being given to each applicant. So thorough was the examination that every one was pleased, and all save 5 voluntarily reported, and finally all were examined and given advice. Mr. Kendall added that in his institution women applicants when accepted pass a superficial examination by the factory nurse, who claims that she thereby gets acquainted with the worker before she starts to work, and in cases of rejection the applicant leaves with a better idea of what she should do for herself.

John M. Bruce, of the American Tobacco Company, told of his experience with the sales department of which he is manager. Formerly there were 40 state managers and sub-groups, and these did their own hiring and firing. Some 85 to 90 per cent. of all men hired were discharged within 4 months, and it was figured that each salesman cost $500 to $1000 before he left the employ of the company. In place of this, Mr. Bruce devised a system of centralized employment of salesmen and worked up the scheme, partly with the assistance of Professor Scott of Northwestern University, Professor Thorndike of Columbia University and Professor Münsterberg of Harvard. A psychological test for salesmen is required. This test is given by a group of trained men, including 10 advanced students and professors, and the test is of 9 hr. duration. The tests are made quite disagreeable and it is found that such applicants as stay them out have enough enthusiasm to go farther. Medical examination is then required more rigorous than for regular life insurance. After this the recruits have 2 months of schooling, and the result has been that the reduction in losses by discharge has decreased to 11 per cent. There are 600 salesmen all told and they are dealt with individually through the bonus system.

EXPORTS WITH DRAWBACK

Heavy Decline in Fiscal Year 1914—Revision of Law Needed.

WASHINGTON, D. C., December 7, 1914.—A heavy decline in the exports of manufactures with benefit of drawback of the duty paid on imported materials used in their production is shown in the official statistics for the year ended June 30, 1914, which have been compiled for *The Iron Age* by the Bureau of Foreign and Domestic Commerce. Owing to peculiar conditions the iron and steel trade did not share in this decline, but there has been a cessation of applications for new drawback regulations, a tendency that will soon manifest itself in reduced totals of drawback paid under the metal schedule.

It appears from the official figures that while there was a loss of 7.6 per cent in the total exports of manufactured products in 1914, as compared with 1913, the aggregate drawbacks paid on all classes decreased no less than 30 per cent. A careful inspection of the statistics of this movement shows that the decrease is due to the operation of the amendments to the drawback law by the framers of the Underwood-Simmons tariff act. The new drawback provision was in operation for 10 months of the fiscal year 1914 and the results are clearly apparent.

The relation of drawbacks paid on the exportation of goods manufactured in part of foreign materials to the total exports of manufactures of all kinds in the past decade is shown in the following table:

Fiscal year	Exports of manufactures	Drawbacks paid
1905	$611,425,574	$5,806,475
1906	686,023,169	5,831,124
1907	740,314,557	5,445,150
1908	742,575,841	6,637,602
1909	671,416,014	6,604,432
1910	768,309,063	6,182,375
1911	907,519,841	6,402,603
1912	1,020,417,687	4,525,570
1913	1,185,104,309	4,543,536
1914	1,099,132,210	3,165,082

From these figures it appears that the drawbacks paid in 1914 were less than half the total in 1911. High-water mark in the payment of drawbacks is not shown in the table, having been reached in 1885, when the total was $8,524,935. The reductions in 1912 and 1913 as compared with 1911 were due to more stringent requirements for drawback regulations put in force by the Treasury Department. The history of the drawback movement in recent years shows clearly that the growth of our export trade with benefit of drawback is quite at the mercy of those charged with the framing of the law and regulations thereunder. No amount of enterprise on the part of exporting manufacturers can overcome the obstacles thrown in their way by statute and regulation. The total drawbacks paid on articles manufactured in whole or in part of foreign materials dutiable under the metal schedule of the tariff during the fiscal year 1914, as compared with 1913 are shown in the following table:

Articles exported	Drawbacks paid 1913	Drawbacks paid 1914
Agricultural implements	$1,267	$372
Aluminum rods and coils	82,230	96,067
Aluminum kitchen and table ware	403	.....
Aluminum plates and sheets	158,187	150,033
Aluminum vacuum cleaners and parts	2,079	1,280
Aluminum lightning arresters and parts	1,600	1,700
Aluminum, all other manufactures	953	1,200
Armor plate	.....	366
Babbitt and similar metals	8,684	7,677
Automobiles	3,773	15,684
Automobiles, parts	5,950	3,704
Passenger and freight cars for steam roads	3,639	11,320
Passenger and freight cars for other roads	64	603
Cycles and parts of	1,990	.....
Electrical cable	45,077	26,926
Other electrical appliances	3,758	6,001
Bars and rods, steel	493	.....
Billets, steel	39	2,354
Sheets and plates, galvanized	59,969	102,919
Steel saw plates	5,311	4,268
Structural iron and steel	1,049	2,678
Wire	.....	49
Wire, galvanized	30,606	59,856
Wire rope	19,186	12,183
Wire, all other manufactures of	460	507
Builders' hardware, locks, hinges, etc	2,234	530
Saws	14,670	1,936
Castings, not elsewhere specified	74	.....
Cutlery	18,568	9,039
Hose, flexible metal	92	11
Sewing machines	5,904	4,396
Locomotives	18,056	10,398
Other engines and parts	5,712	3,644
Sugar-mill machinery	3,272	1,522
All other machinery	1,105	4,148
Nails, cut	31	.....
Nails, horseshoe	848	2,287
Needles	3,845	3,385
Pipes and fittings	603	.....
Rail joints, continuous	10,008	.....
Steel rails	8,197	8,206
Scales	136	38
All other manufactures of iron and steel	846	232
Lead, tin foil	32,831	16,608
Lead pigs and bars	1,833	1,511
Lead pipes, fittings, etc	4,731	5,425
Lead seals	8,441	3,543
Lead sheets	,6,795	27,156
Lead shot	13,973	7,347
Type metal	2,251	.....
All other manufactures of lead	1,317	881
Metal containers, not including tin cans	27,153	34,868
Tin cans	70,856	92,835
Tin sheets, embossed	546	405
Tin plates, lithographed	2,392	.....
All other manufactures of tin	64	.....
Shade rollers	2,432	2,895
Zinc shavings	372	338
Total	$706,785	$750,965

WHY IRON AND STEEL PRODUCTS GAINED

It will be seen that iron and steel manufactures have not shared in the decline which has marked the general drawback movement but have made a small gain. This is due, however, not to an increase in the utilization of the drawback law by manufacturers throughout the trade, but merely to increased exports under regulations obtained several years ago and not affected by the new law. The net gain of $44,180 is much more than accounted for by the increase in galvanized sheets and plates of about $43,000, in galvanized wire of more than $19,000, and in tin cans of about $22,000. The entire list is marked by fluctuations which

reflect the precarious character of the business based on drawbacks as obtainable under the present law and the regulations to be secured in accordance therewith.

The gain in drawbacks on tin cans is due to the fact that the early part of the fiscal year 1914 considerable quantities of Welsh plate were imported for use in the manufacture of containers for petroleum intended for exportation. During the remainder of the year the American Sheet & Tin Plate Company supplied this plate, paying the petroleum shippers an unofficial drawback approximately equaling the amount obtainable on foreign plate. Through this unofficial drawback the domestic plate manufacturers have been able to cut down the imports of Welsh plate to a comparatively negligible quantity, although a decade ago the official drawbacks on foreign plate exceeded $1,000,000 annually.

The official records show not only the articles exported with benefit of drawback but the materials upon which the refunds were paid. Nearly all the aluminum products exported were made of crude imported aluminum; the steel bars, rods and billets of imported scrap iron and steel; the galvanized iron sheets, plates and wire were coated with imported zinc; the steel saw plates and saws were made of bands and sheets of imported steel; the structural iron and steel was made wholly of imported iron ore; the steel rope of foreign steel wire; the builders' hardware of foreign steel and the cutlery of imported horn handles. A great variety of imported materials entered into the manufacture of the locomotives, including brass tubes, copper pipes, steel boiler tubes, wheels and tires, steel brake-work and charcoal iron blooms and bar iron.

THE NEW TARIFF LAW AT FAULT

The first year's test of the amended drawback law demonstrates beyond all doubt that it will operate to reduce drawback allowances and to increase the difficulty of obtaining new regulations. That it will cause agitation for modification goes without saying. The provision that has so greatly reduced the efficiency of the drawback principle as applied to the extension of our export trade forbids the allowance of drawback upon the exportation of any product or by-product unless such product or by-product would be dutiable if imported into the United States. Thus, it is no longer possible to obtain a drawback on the exportation of scrap iron or steel which may result from the manufacture of foreign iron or steel plates, bars, rods, etc., into products intended for use in this country. This new provision at one stroke has wiped out several promising industries in certain trades and has seriously hampered others. A large business was built up under the old law through the importation of linseed, the extraction of the oil therefrom for domestic use and the exportation of the oil-cake with benefit of drawback, but as oil-cake is now on the free list it is no longer eligible to rebate of duty and the practical effect is to raise the price of linseed oil to the domestic consumer.

The first year's experience under the new drawback law should serve to bring about its speedy repeal whenever the tariff is again revised and it would not be surprising if sufficient sentiment should develop to secure at a comparatively early date the passage of an independent measure liberalizing the drawback provision along lines that will make it a real help to the export trade.

W. L. C.

The McDonough Mfg. Company, Eau Claire, Wis., sawmill and lumbering construction and equipment, has recently booked several important contracts in the South, and last week received an order to equip a large mill. Two months ago work on equipment for several large mills was held up by orders from purchasers to delay deliveries until conditions improved. These contracts will now be filled during the winter. The company reports the largest volume of business on its books at this time since its establishment.

The Bontempi Rust Proofing Company has transferred its offices to 353 Water street, Bridgeport, Conn. The company controls the Bontempi process, which gives a black gun metal finish, to which in turn enamel or paint may be applied if necessary.

SKILL IN THE FOUNDRY TRADE

Causes of Its Decline—No Good Substitute for Apprenticeship

Deploring the great scarcity of competent molders, an appeal for the preservation of skill in the foundry and other industries was made in an interesting paper on "The Foundry as an Adjunct to Engineering" presented by Thomas D. West, of the West Steel Casting Company, Cleveland, before the Cleveland Engineering Society, December 1. The greater part of the address was devoted to a review of developments in the foundryman's art, numerous lantern slides being shown.

Referring to the three branches of founding—green sand, dry sand and loam molding—and to the fact that there are some fifty specialties in iron castings, in addition to steel, malleable, aluminum, bronze, brass, and other alloy castings, he said that injury has come from men claiming to be authorities on founding who have experience in only one branch or specialty but who attempt to teach general principles. Buyers of steel castings have learned that it is desirable to have steel foundries specialize in making light, middle and heavy castings and that the different types require different shop methods and appliances. In the iron foundry it requires extensive experience to determine whether a large casting should be made in green sand or, to be safe, should be made in dry sand or loam, the cost of the last named being two or three times that of other methods. Today fully 70 per cent. of the proprietors of foundries are inexperienced in the actual work of core making, molding and melting. As the men they employ become scarce, they have no ability to teach new ones how to do this work. A foundry in Ohio was recently compelled to close for several months to await the finding of an experienced molder to manage its work and men. Scarcely half the men working as molders can handle the foundry's simplest tools, the shovel and riddle, in a skillful manner.

The speaker also referred to the difficulty in securing common labor in prosperous times. The decrease in skill in the art of molding and the scarcity of common labor he attributed to the "universal craze of the young to escape any labor that begrimes or callouses." He declared one cause of inefficiency is the idea that boys may get a mastery of trades through manual or trade schools, the scarcity of competent teachers being to some extent to blame for this. He called trade schools playhouses and an excuse for boys to escape the prods of a boss that would make them efficient workers. One solution of the labor problem was to have much higher wages for common labor and for all high class artisans than for those who prefer clean work that requires little training. He declared it is high time that the factors working an injury to engineering, manufacturing, transportation and all their allied interests, were faced and brought prominently to public attention. There is entirely too much teaching of children in the art of playing and little effort to make them serious, skillful and trustworthy masters of crafts.

In reply to questions Mr. West said that he favored the old fashioned apprenticeship system and he believed that this would eliminate many of the present evils. He preferred it to trade schools or technical schools for the training of founders. He said that a boy to become a founder does not need a high school or college education but should know drafting and something of metallurgy and of chemistry. In reply to other questions he said that he regarded a two-story foundry as practical and economical for certain kinds of work. While light and ventilation had to be considered there was danger of getting too much light in the foundry as the sun would dry up the sand. On the general question of pouring temperatures for castings he said the hotter the metal is poured the greater are the chances for securing clean castings.

The W. M. Pattison Supply Company, Cleveland, Ohio, dealer in machine tools, will open a branch office in Detroit, Mich., January 1.

OBITUARY

JOSEPH BLOCK, founder of the firm of Block & Pollak and the Cincinnati Forge & Iron Works, which later were merged into the Block-Pollak Iron Company, Chicago, died December 6, aged 83 years. His death came suddenly through a complication of minor ailments made serious by his advanced age. He was born in Phaffenhofen, France, and came to this country at the age of seven. The firm of Block & Pollak was organized in the early sixties. Mr. Block had great confidence in the industrial possibilities of Chicago, and in 1893 joined in the organization of the Inland Steel Company, which began as a small operation at Chicago Heights. He continued as a director in that company from its inception, in which capacity he was in no small measure responsible for the establishment of its Indiana Harbor works; in fact, he attended the meeting of the executive committee of that organization within one week of his death. He was also a director of the Buffalo Steel Company, Tonawanda, N. Y. Mr. Block did not make his home in Chicago until 1901, but since that time through his deep interest in religious and charitable work he became affiliated with many public organizations. He was a member of the Standard Club and the Lake Shore Country Club. He leaves three sons, L. E., P. D. and E. J. Block, all of whom are active in the organization of the Inland Steel Company, and four daughters.

ERNEST THEODORE LIPPERT died at his home in Millvale, a suburb of Pittsburgh, Pa., December 4, aged 73 years. He was born in Germany, came to this country in 1867, worked as a glass blower for a time and then learned the saw-making business with Lippincott, Bakewell & Co. In 1880 he established a small shop of his own in Pittsburgh. Nine years later he bought the business of the Pittsburgh Saw Works from Hubbard & Co. He operated the two places separately, but in 1896 he established the Penn Saw Works at Millvale and with it consolidated his two old factories, operating as the E. T. Lippert Saw Company. He was twice married and leaves his widow and five daughters.

CHARLES J. CANDA, Summit, N. J., died November 29, aged 76 years, after a long illness which followed a stroke of paralysis. He was born in Paris and came to America in his youth. Starting as a clerk, he rose to become the president of important railroad companies. At the time of his death he was vice-president of the Chrome Steel Works. He was prominent in politics for many years and served a term as assistant treasurer of the United States under President Cleveland. He leaves his widow, two sons and three daughters.

AMBROSE T. MATTHEWS, Worcester, Mass., founder of the business of the Matthews Mfg. Company, manufacturer of pressed metal specialties, is dead at the age of 71 years. A native of Whitefield, Me., he became a resident of Worcester in 1864, and after service in the Federal army started the development of the stamping of sheet metal, and established the Worcester Ferrule & Mfg. Company, with John H. Bennett and Edmund Converse. In 1889 he associated himself with F. E. Reed and John Reed in the Matthews Mfg. Company.

SAMUEL BENEDICT CHRISTY, a metallurgist of wide reputation, died November 30 at his home in Oakland, Cal., aged 61 years. He was a native of California and was graduated from the College of Mining of the University of California in 1874. Joining the faculty, he was made dean of the college in 1879, holding that position at the time of his death. He was an author and a discoverer of many methods for the treatment of ores. He leaves his widow and two daughters.

AUSTIN F. CUSHMAN, president Cushman Chuck Company, Hartford, Conn., died November 29, aged 84 years. He engaged in the manufacture of chucks in 1862 and was made president of the company when it was organized in 1885. Although blind for a number of years and for that reason unable to give much attention to details, Mr. Cushman kept in close touch with the business until the last few years.

MOSES LEHMAN, Pittsburgh, Pa., died November 25, aged 65 years, after a long illness. He was born in Germany and came to this country in 1865, locating in Pittsburgh, where he was engaged in the manufacture of clothing for many years. Retiring from that business six years ago, he organized and became president of the Blaw Steel Construction Company. He leaves three sons and a daughter.

NEWBOLD ETTING, Philadelphia, died December 8, aged 51 years. He was a native of Philadelphia and was graduated from the University of Pennsylvania in 1884. He was engaged in the foundry supply business, having his office in the Land Title Building, and was also a cricket player of wide reputation. He leaves his widow.

JAMES T. BRAYTON, manager of the Chicago branch of the Julius King Optical Company, died suddenly of heart disease at his home December 6.

Pittsburgh and Nearby Districts

The sales managers of the Youngstown Sheet & Tube Company held their annual meeting last week in Youngstown, Ohio. On Tuesday the party inspected the plants of the company and in the evening participated in an informal dinner. On Wednesday business sessions were held and in the evening the sales agents left for their homes. Those present were from New York, Philadelphia, San Francisco, Denver, Dallas, Seattle, Atlanta, Savannah and Pittsburgh.

Manufacturing plants in the Youngstown district are working on a fuller schedule this week than for some time. Six of the open-hearth furnaces of the Brier Hill Steel Company are in operation, while its blooming, sheet bar and sheet mills are running practically full. The Youngstown Sheet & Tube Company is operating two of its four blast furnaces, and its Bessemer and open-hearth steel plants and finishing mills are running at about 65 per cent. of capacity. Three of the six blast furnaces at the Ohio works of the Carnegie Steel Company are in operation, while its Bessemer and open-hearth steel plants, blooming and billet mills are running to about 50 per cent.

The report that the LaBelle Iron Works, Steubenville, Ohio, had secured an order for 14,000 kegs of cut nails for shipment to England is officially denied. The company has, however, received an order for a sample car of cut nails from a New York house for export, and possibly larger business may result in the near future.

Attorneys for a Pittsburgh taxpayer who sought to prevent the carrying out of a contract for the building of the Schenley high school, on the ground that it was not awarded to the lowest bidder, will take the case to the Supreme Court. The board of education awarded the contract to the James L. Stuart Company. The structure will require about 1300 tons of steel, and it was to be furnished by the Riter-Conley Mfg. Company.

No. 2 blast furnace of the Andrews & Hitchcock Iron Company, Youngstown, Ohio, which has been under process of rebuilding for some months, will be ready for operation early in 1915. It is expected to have a daily capacity of about 500 tons.

Advices have been received in Pittsburgh from J. Rogers Flannery, chairman of the city's foreign trade commission, that he has established offices at 64 Victoria street, London, England, in order to better facilitate the handling of orders for iron and steel products in Pittsburgh. Mr. Flannery says a practical system of getting in touch with prominent firms of the United Kingdom has been completed.

The Pittsburgh Emery Wheel Company has removed its headquarters from 603 Park Building, Pittsburgh, to its factory at Rochester, Pa. All correspondence formerly addressed to the general offices in Pittsburgh should be sent to the factory in the future.

The report that the Best Mfg. Company, Pittsburgh, is discontinuing the manufacture of steam and hydraulic pipe lines is officially denied.

The Machinery Markets

Reports from the principal cities where machine tools are manufactured and marketed are unanimous in stating that domestic business is on the increase, while foreign orders continue much in evidence. Steady sales have been made in New England, though the demand for some types of machines shows but slight improvement. In Detroit demand is more active with the buying of a miscellaneous character and including both metal and wood working machines. From scattered sources there is a better flow of orders in Cleveland and the demand for automatic screw machines for export continues good. Cincinnati has continued to receive foreign orders, but the greatest encouragement is drawn from more copious domestic inquiry. Decidedly better conditions exist in Milwaukee. Inquiries are numerous and the prospects good in the Central South. Very little business has so far resulted from recent inquiries in the Birmingham district, but machinery men have faith in the near future. In Texas a gradual improvement is felt despite the bad outlook in Mexico. The business in new machinery in St. Louis is stated to be about 60 per cent. of normal, with second-hand equipment quiet. In San Francisco November was a dull month and machine shops in general are not active, but the Union Iron Works has taken some good contracts. In the Pacific Northwest there is a fairly good demand for irrigation, mining and milling machinery.

New York

NEW-YORK, December 9, 1914.

The interest of a considerable part of the local trade continues to be centered in export propositions of which a few of large size are now in hand. In all of them turret lathes are largely specified. Taken as a whole the domestic demand is quiet, though the market is moving toward better conditions. One recent sale involved about $7000 worth of tools for a talking machine company.

Plans are under way for the enlarging of at least two firearms factories. The Remington Arms Company, Ilion, N. Y., has let the general contract for a group of 4 buildings to James Stewart & Co., 30 Church street, New York. They will cost about $500,000. A new plant of the same kind at Bridgeport, Conn., which is to have a capacity of 1000 rifles a day will require machine tools to the value of $1,000,000. Many of these tools, of course, are of a special character. In this connection it may be noted that a representative of the French Government has been inquiring for the special machines which are used in boring rifle barrels. He found that the regular makers of such machines were filled to capacity with orders and had asked other tool makers if they would undertake to make them, but met with declinations. A Utica arms manufacturer is also reported to be contemplating an addition to present equipment.

So far as can be learned no new shrapnel contracts have been placed and the trade is disappointed as some large machine tool orders were contingent on such contracts being received. Both French and Russian shrapnel specifications have been considered. The Russian design is not an easy one to manufacture. A representative of Russia is quoted as saying that he had received dozens of estimates, but that in his opinion the majority were not worthy of consideration. Small shops which he was certain did not have the necessary equipment had put in bids, figuring on buying all of the necessary machines if they got an order and expecting the price obtained to pay for them, as well as yield a profit. The Russian said he had come to the conclusion that it would be best for his country to buy the necessary machines, make the cases in Russia and thereby get the shrapnel at a lower price than can be obtained here and incidentally have possession of the machinery when the emergency was past. The bids he had received varied all the way from about $6.50 to $12.50, whereas shrapnel can be turned out in private shops in Russia for about $3.50. Moreover, some of the bidders wanted to do only certain parts of the work and others wanted to leave other parts undone. Some argued against the design of the case, saying that the English or some other shell was more in accord with their ideas of how one should be constructed, to which the Russian replied that he and his countrymen believed their shrapnel to be the best. He said he thought it probable that the matter might resolve itself into the forged blanks alone being purchased here.

The Watson-Stillman Company, Aldene, N. J., has received an additional order for two shields similar to the ones they are constructing for boring the East River tunnels. The company has also received an order for eight presses used in the manufacture of automobile truck wheels and with other business recently booked it is so busy that a part of its shop force is working at night, while another part is working to 9 o'clock in the evening.

The inquiry for about 70 small turret lathes issued by the Baldwin Locomotive Works, Philadelphia, is still pending, presumably pending instructions from Russia.

J. & F. Eifert, 199-203 Avenue D, New York, manufacturers of cigar box lumber, have leased property at 205-211 Avenue D, and will erect a three-story factory.

Bids have been taken for a four-story reinforced concrete lithographic factory to be erected on Meadow street, Long Island City, for the Degnon Realty & Terminal Improvement Company, 39 East Forty-second street, New York. William Higginson, 13 Park Row, New York, is the architect.

The Hospital Association, New Rochelle, N. Y., of which H. J. Parker, 40 Forty-first street, New York, is president, is having plans prepared for additions, including a power plant of steel, brick and stone, at an estimated cost of $125,000.

The capital stock of the Jewell Steel & Malleable Company, Buffalo, has been increased from $50,000 to $200,000. A portion of the increase is to provide for additional manufacturing facilities at its plant at the New York Central Railroad and Hertel avenue.

The plant of the Geneva Glass Works, Geneva, N. Y., was destroyed by fire November 22, with a loss of $100,000 on buildings and machinery. It will erect a temporary building. Machinery equipment has been arranged for.

Plans are being completed for extensions to the plant of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., which will include an 8000-kw. turbo-generator and an electric crane.

The International Foundry Company, Syracuse, N. Y., has completed plans for a plant for the manufacture of a patented brake shoe. F. E. Ehrgood is secretary.

The Motor Kart Company, Scranton, Pa., will build a two-story factory, with power house, to cost about $50,000. G. C. Wolf, Hotel Jermyn, Scranton, is in charge.

John Ehmann, 926 Mountain street, Philadelphia, is building a two-story factory, 45 x 102 ft., to cost about $7000.

The Norwich Chemical Company, Olean, N. Y., will erect a factory at East Smethport, Pa., for the manufacture of di-methyl ketone, etc. R. Kessler, Jr., Crosby, Pa., is the general manager.

The Great Eastern Rubber Company, Allentown, Pa., has been incorporated with a capital stock of $100,000 by C. R. Fluck, D. M. Knabb and Van A. Nagle, for the manufacture of rubber tires.

New England

BOSTON, MASS., December 8, 1914.

The machine-tool people who build machinery for making war materials and the equipment for making them continue to receive orders in a steady flow, but no large single order has been booked in the last fortnight, despite the statements of the daily press. The demand is for turning machines, especially lathes and the larger sizes of automatics and semi-automatics, screw machines and grinding machines, mostly for shrapnel work. The new gun factories and additions to gun factories here and abroad are stimulating works that produce high-grade machinery to develop the special equipment required for making small arms, especially standard army rifles, including rifling machines, for these classes of machinery are wholly out of the market. Many of the machine-tool builders are running on a normal basis, a few being rushed to the full limit of capacity, and the number of workmen employed is increasing each week. While the planer and radial and upright drilling machine business is still dull, a certain amount of improvement is noted.

A great variety of industry is affected by the demand for war equipment, but the result on other lines of manufacturing is only gradual. For example, the wire business of New England, which consists to a large extent of specialties, is not good, the spurt of a few weeks ago not having been maintained. This is due in a large degree to the approaching inventory season, for neither manufacturers nor jobbers are in the habit of buying freely at this time of year. The second week of January should tell the story of whether or not the winter will see a consistent revival in business, according to the statements of the wire makers, and they, as a class, share the generally prevailing belief that things are on the up grade and will continue so.

Some of the textile machinery manufacturers report a sudden influx of inquiries. This branch of manufacturing has been up and down in the last six months, and decidedly spotty. New inquiries are received by firms which had been running along for weeks with hardly a bit of new business on their books.

The Standard Mfg. Company, Bridgeport, Conn., manufacturer of gear cutting machines and electrical specialties, is planning the erection of an addition, 50 x 90 ft., two stories and basement, of brick and steel.

The Bridgeport Brass Company, Bridgeport, Conn., has awarded the contract for a factory addition to be erected on East Main street, to be 90 x 134 ft., four stories and basement, of reinforced concrete.

The addition to be built by the Royal Equipment Company, Bridgeport, Conn., to its quite recently acquired property on Railroad avenue, will consist of a brick building 74 x 91 ft., three stories and basement, with an ell 12 x 40 ft.

In addition to the large extensions of the manufacturing buildings of the Winchester Repeating Arms Company, New Haven, Conn., contracts have been awarded for a shooting range, 52 x 675 x 47 ft., one, two and three stories, of reinforced concrete, estimated to cost $100,000.

The Persons-Arter Machine Company, Worcester, Mass., has been organized under a Massachusetts charter with $60,000 capital stock. Charles A. Persons is president and treasthird director. Mr. Persons is well known as a manufacturer. He is president of the Persons Mfg. Company, Worcester. The company will manufacture metal products, the nature of which it is not ready to announce; and will establish urer; Peter J. Nihill, clerk, and Robert E. Wesson, Jr., the a factory in Worcester, for which machine tools and other equipment will be required.

The Morgan Spring Company, Worcester, Mass., manufacturer of wire, wire springs and other specialties, has awarded the contract for improvements to its works at Greendale, which will mean an increase in manufacturing capacity. Space between two buildings will be roofed in and wire drawing machinery will be installed on the premises.

Chicago

CHICAGO, ILL., December 7, 1914.

The Shoger Mfg. Company, Chicago, has been incorporated with a capital stock of $2500, to manufacture and deal in auto supplies, equipment, etc. G. D. Wellington, 29 South LaSalle street. H. C. Peterson and Ernest W. Clark are the incorporators.

M. Goldschmidt & Co., Chicago, have been incorporated by Alexander and Max Goldschmidt and Julius Phillips, with a capital stock of $2500, to manufacture and deal in electrical motors, appliances, etc. Mesirow & Berger, Harris Trust Building, Chicago, are the attorneys.

The Carbo Steel Post Company, Chicago Heights, Ill., has increased its capital stock from $15,000 to $150,000.

The bridge shop and pattern rooms of the Chicago & Eastern Illinois Railroad, at Danville, Ill., were badly damaged by fire.

The McKinney Tractor Company, Belleville, Ill., recently incorporated by Edwin Abend, G. A. Becker and H. E. Knipkamp, will take over an established plant, which will be modernized and equipped with additional machinery.

William Rothe, East St. Louis, Ill., has started the erection of a one-story, 50 x 109 ft., brick machine shop.

The Compresson Ring Company, Rockford, Ill., has been incorporated with a capital stock of $50,000 by A. A. Martin, M. R. Harned and E. S. Rastall, and will equip a manufacturing plant.

The Westcott Auto Sales Company, Casey, Ill., has been incorporated with a capital stock of $10,000 by W. C. Turner, H. M. Grant and J. W. Yananay, and will equip a repair shop with drill presses, lathes, etc.

The Cicero Dairy Company, Cicero, Ill., has been incorporated with a capital stock o $10,000 by F. J. Zanrobsky, J. Matejka, Josef Hudek and others, and will install a power plant, etc.

The West Suburban Garage Company, LaGrange, Ill., has been incorporated with a capital stock of $12,500 by H. D. Howe, C. C. Collister and H. L. McConnell.

W. C. Marsh, Ft. Madison, Iowa, will enlarge his planing mill and will install additional machinery.

The Christie Engine Company, Clinton, Iowa, has contracted for a factory site and contemplates spending $100,000 for building a foundry and machine shop for manufacturing the Christie air-steam engine.

The board of commissioners, Wellington, Kan., will receive bids until December 17 for engines, generators, pumps, boilers and all other equipment for a waterworks plant and an electric light plant. The Benham Engineering Company, Oklahoma City, Okla., is in charge of construction.

The Lasure Mfg. Company, Cedar Falls, Iowa, recently organized for the manufacture of a friction clutch, has arranged with the Cedar Falls Machinery Company for its manufacture.

Fire in the roundhouse of the Missouri Pacific at Horace, Kan., did about $50,000 worth of damage.

Plans are in progress for a one-story brick and concrete ice plant, 50 x 60 ft., for the Neodesha Crystal Ice Company, Neodesha, Kan., to cost $12,000. An 8½-ton refrigerating machine, a 20-hp. alternating-current motor, etc., will be required.

Garren & Hine, Muscatine, Iowa, are erecting a fireproof machine plant.

Wright, Barrett & Stillwell, University street, near Hampden street, St. Paul, Minn., will erect a one-story addition to their plant, to cost $12,000.

Milwaukee

MILWAUKEE, WIS., December 7, 1914.

The business pendulum has started on its return swing and the depression is broken. For a month or more it has been the foreign business that has created optimism. Now a brisk domestic demand has set in. Inquiries are increasing rapidly and bear the earmarks of more than passing interest. The first week of December pay-rolls have increased slightly and employers are of the opinion that this movement will be accelerated during the winter. Collections in all lines are showing improvement and bank statements reflect a larger volume of business.

The United States Steel Tie Company, Milwaukee, capital stock $1,000,000, has been incorporated by L. W. Ashley, E. M. McVicker and E. Bub, to manufacture steel railroad ties designed by Mr. Ashley, who has been operating a small manufacturing plant for some years. Mr. McVicker is an attorney, but well known in manufacturing, being president and treasurer of the Badger Concrete Mixer Company, Milwaukee.

The board of education, Oshkosh, Wis., is having plans prepared by Henry Auber, Oshkosh, for a central heat and power plant.

The C. H. & E. Mfg. Company, 321 Mineral street, Milwaukee, manufacturing gasoline engines, tractors, concrete mixers, etc., has broken ground for a factory to cost $15,000 to $20,000, located at Clinton and Mineral streets. It will be of brick construction, 100 x 100 ft., two stories. The general contract has been awarded to Charles B. Danielson, Milwaukee.

The C. F. Kade Fixture & Showcase Company, Plymouth, Wis., has increased its capital stock from $35,000 to $75,000 and will increase its output correspondingly. The equipment of wood and metal-working machinery will be increased.

The $35,000 garage now being erected at Fourth and Wells streets, Milwaukee, by Julius Straus & Son, has been leased by the Wells Garage Company, composed of E. A. DeLarvalle, Samuel Carroll and J. F. Kuberth. Mr. Carroll will have charge of the mechanical department.

The Superior Box Factory Company, Superior, Wis., will erect an addition to its plant at South Superior, to cost $30,000. No additional machinery is contemplated.

Bids for furnishing the boilers and materials for the interior finish of the north wing and two pavilions of the new $6,000,000 capitol building at Madison, Wis., will close December 15 in the office of L. F. Porter, secretary of the capitol commission. George B. Post & Son, 101 Park avenue, New York, are the architects.

Work has been started on a new $8000 garage and repair shop for Martin Mohr, Beaver Dam, Wis. One freight elevator will be required.

A co-operative company is being organized at Wausau, Wis., to establish a packing and cold storage plant to cost $250,000. Already $100,000 has been subscribed and tentative plans are being made.

Indianapolis

INDIANAPOLIS, IND., December 7, 1914.

The St. Louis Financial & Real Estate Company, which is erecting at Alexandria, Ind., a mineral wool plant to cost $250,000, states that this will be followed by a plant for the manufacture of mineral wool articles, to cost $100,000.

The Schmidt Ceramic Company, Berlin, Germany, has bought an abandoned glass factory near Porter, Ind., and will establish a plant for the manufacture of special chinaware, which it is said will be the first of its kind in the United States.

The Wabash Specialty Company, Wabash, Ind., has been incorporated with $20,000 capital stock, to manufacture articles of metal, wood and cement. The directors are I. M. Harkes, J. B. Chapler and C. A. Butler. It then changed its name to the Wabash Sanitary Company.

The Chad Lathe Company, Newcastle, Ind., has been incorporated with $5000 capital stock, to manufacture machinery and tools. The directors are N. D. Chad, A. S. Long and J. L. McNab.

The Allen & Curtis Company, Mishawaka, Ind., has been incorporated by R. A. Allen, A. O. and M. M. Curtis, with $5000 capital stock, to do a general machine and repair business.

The Kokomo Foundry & Machine Company, Kokomo, Ind., has been incorporated with a capital stock of $30,000 to manufacture an automatic forced-draft underfeed stoker for boilers. Manufacturing plans are not yet formulated. T. O. Callis is president; H. L. Draper, general manager, and Lain Johnson, chief engineer.

The Plost Fence Post Company, Anderson, Ind., has been incorporated with $50,000 capital stock to manufacture fence posts. I. Plost, J. W. Knight and S. J. Mack are the directors.

The Contractors' Specialty Company, Griffith, Ind., has been incorporated with $10,000 capital stock, to manufacture equipment used in construction work. The directors are F. R. Scholefield, Milton Hart and Laurent de St. Aubin.

The Pavey Electric Company, Indianapolis, Ind., will build a plant at Charleston, W. Va., 175 x 200 ft., two stories.

The Lansing Silo Company, Bargerstown, Ohio, will establish a plant in Brazil, Ind., to employ about 100 men.

The Dudlo Mfg. Company, Ft. Wayne, Ind., has been incorporated by W. E. Mossman, B. P. Mossman and G. A. Jacobs, with $50,000 capital stock, to make enameled and electrical wares. It has started work on a two-story brick addition to its plant.

The Ridgeville Electric Light, Heat, Power & Water Company, Ridgeville, Ind., has been dissolved.

The Automobile Accessories Company, Logansport, Ind., has been incorporated with $25,000 capital stock, to manufacture automobile supplies. The directors are C. E. Young, C. B. Billman and J. Lairy.

The Elkhart Carriage Company, Elkhart, Ind., has reduced its capital stock from $200,000 to $50,000.

Detroit

DETROIT, MICH., December 7, 1914.

A better feeling prevails in the local machine-tool market. The demand for single tools is more active and there has been some miscellaneous buying of machines that has helped to swell the totals of the week. The betterment is general, both metal and wood-working equipment being included in the sales. The general industrial situation is much the same, although a number of plants which have been operating intermittently are now apparently in for a steady run. Some lines of manufacture are considerably stimulated by orders from foreign sources; notably among these are the automobile truck industry, brass goods of various kinds, leather and woolen goods. Construction work continues at a low ebb, chiefly owing to the difficulty in obtaining the necessary financial aid from the banks.

The Saxon Motor Company, Detroit, automobile manufacturer, has acquired the plant of the Abbott Motor Company containing about 120,000 sq. ft. floor space, and plans to triple its output of automobiles during the coming year. This transaction puts an end to the rumor that the Saxon Company would remove its plant to Cleveland. It is stated that the manufacture of Abbott cars will be continued in a leased plant.

The Hudson Motor Car Company, Detroit, has completed plans for an enlargement of its plant which will give it approximately one-third more floor space. The main building, 60 x 600 ft., and three wings thereto, each 50 x 500 ft., will be capped by an additional story. The output of the plant will be considerably increased.

The Bowering Soap Company, Detroit, has acquired a seven-acre site at Ecorse, a Detroit suburb, and will erect a plant 80 x 395 ft., four stories. In addition to soap the company will manufacture by-products and toilet preparations.

The Enamel Cement Block Company, Detroit, has been incorporated by G. D. Laughry, F. E. Atchison and W. A. Stellberger, and will manufacture cement block under a new process. A factory has been acquired and the necessary equipment provided for.

The plant of the Egyptian Portland Cement Company, Fenton, Mich., has been sold to a syndicate headed by H. J. Paxton, Detroit. It will be rehabilitated and placed in operation.

The Jordan & Steele Company, Hastings, Mich., manufacturer of laundry equipment and plumbing specialties, is increasing its capacity by the installation of additional machinery.

The citizens of Port Huron, Mich., have raised the $100,000 asked by the Grand Trunk Railroad, for the rebuilding of its shops in that city, and it is stated that negotiations for the erection of the new buildings are already under way.

The Piston Ring Company, Muskegon, Mich., has completed a foundry, 52 x 112 ft.

Cleveland

CLEVELAND, OHIO, December 7, 1914

The demand for standard machine tools shows considerable improvement. A fair volume of orders ranging from single tools to two or three machines is coming from scattering sources, particularly from makers of automobile parts and from stamping works. An order for several machines has been placed by an Ohio automobile plant. A new machine shop in Elyria has placed an order for several second-hand machines, the demand for which has also picked up. The foreign demand for automatic machines continues good, several additional small orders having come from the nations at war. An inquiry from Russia for 46 automatics, recently noted, is still pending. Domestic orders for automatic machinery are light. In the foundry trade conditions show some improvement.

The city of Cleveland, through its commissioner of purchases and supplies, will receive bids December 17 for three low-lift, steam turbine reduction, gear driven, centrifugal pumps, two with 1,000,000-gal. per day capacity and one with a capacity of 60,000,000 gal. At the same time other equipment will be purchased, including separate surface condensers, air pumps and all necessary appliances and auxiliary for each unit, and one feed water heater. The pumps will be installed in the Division pumping station for use in connection with the new filtration plant.

The Cleveland Skirt & Suit Company will shortly begin the erection of a steel and concrete plant, 35 x 85 ft., on East Twenty-fifth street.

The Toledo-Ford Tire Company has practically concluded negotiations through which it will acquire a factory building on Western avenue, Findlay, Ohio, where it will manufacture automobile tires.

The Shiloh Metallic Company, Shiloh, Ohio, has been incorporated with a capital stock of $100,000, by F. J. Frame, J. W. Page, A. W. Firestone, and others. It will establish a metal specialty factory.

The Everhard Mfg. Company, Canton, Ohio, has been incorporated with a capital stock of $10,000 by C. H. Everhard, and others, to manufacture electric appliances.

The Minerva Rubber Company, Minerva, Ohio, is being organized to build an automobile tire factory.

F. S. Liggett and F. K. Maitland, representing the Hinchberger Mfg. Company, Pittsburgh, Pa., have closed a deal to acquire a factory building in Shreve, Ohio, formerly used for the manufacture of aluminum ware. The new company will manufacture fabric, belting and storm-proof covering.

The States Motor Company, Toledo, has been incorporated by E. M. Cook and H. M. Bassett, and others, with a capital stock of $500,000 to manufacture low-priced automobiles. It has acquired the plant of the Shelby Tube Company on Dorr street.

It is announced that the United Grocers' Corporation will erect a plant in Toledo for the manufacture of spices, coffee and other grocer's products.

The De Vilbiss Mfg. Company, Toledo, will enlarge its plant by the erection of a three-story brick and concrete addition, 50 x 120 ft.

The Miller Rubber Company, Akron, Ohio, will enlarge its plant by the erection of five factory buildings, including one 97 x 100 ft., for curing tires; a two-story building, 40 x 100 ft., for drying room purposes; a power plant, 50 x 76 ft.; a three-story factory, 34 x 110 ft., and a storage building, 64 x 81 ft.

Cincinnati

CINCINNATI, OHIO, December 7, 1914.

Machine-tool builders, as a whole, consider the situation very much more encouraging. Foreign orders continue to come in, and while lathes are still in the lead some demand is noted for planers and milling machines. Probably the most encouraging feature is the fact that domestic inquiry is now showing considerable improvement, and probably more business is now under negotiation than for any period this year. Most of these prospective customers are located in the East, with the exception of a few automobile and auto-truck manufacturers in other sections. The railroads are still holding back, although persistent rumors are circulated that several lists will be issued shortly after the holidays.

Machinery dealers report only a slight improvement in sales; but inquiries are more numerous than for some time. Dealers in factory and mill supplies are now receiving some excellent orders from the machine manufacturers. As stocks had been allowed to be depleted in the past few months, there will doubtless be some heavy buying of supplies after inventories are taken. Apropos of this situation, at a meeting of the board of directors of the Ohio Hardware Association, held in Cincinnati last week, it was ascertained that Ohio hardware merchants have smaller stocks on hand than ever before. As business with the country merchants is close to normal, manufacturers and jobbers of hardware supplies are anticipating a record-breaking spring trade.

The Cincinnati Planer Company, Oakley, Ohio, is now working a full force of men, and some of them on overtime. It is now figuring on more domestic business than for some time past; but the majority of its orders at present are from Europe.

The Haven Malleable Castings Company, Cincinnati, has commissioned C. C. Taylor to prepare plans for an addition to its plant, 50 x 100 ft., one story, of mill construction.

The Hamilton Paper Mills Company, Dayton, Ohio, recently incorporated with $30,000 capital stock, by Milton C. Stern and others, does not contemplate the erection of a new plant. The incorporation was for the purpose of taking over the plant of the Sterling Paper Company, Hamilton, Ohio.

The Shepherd Machine Works, Newark, Ohio, is building an addition to its plant, 40 x 80 ft., one story, of brick construction, to be used for the manufacture of gasoline engines.

The plant of the Newark Artificial Stone & Plaster Company, Newark, Ohio, which was badly damaged by fire last week, will be rebuilt at once and new machinery installed.

The foundry of the Brazil Machine & Foundry Company, Brazil, Ind., that has been idle for some time, has been leased by E. D. Cameron, of Mattoon, Ill., and will be put in operation at an early date.

The Central South

LOUISVILLE, KY., December 7, 1914.

Generally quiet conditions in the machinery trade are expected to prevail during the current month, inasmuch as the tendency of buyers is to hold off until after inventory. Enough new plants are being equipped to give assurances of some immediate business. Reports agree that prospects are good and inquiries numerous. In contrast with the comparatively quiet condition of most industries, machinery houses note that many public service corporations are planning betterments, suggesting that more favorable financial conditions are having a good effect on these interests. While the cotton movement is still slow, better facilities for handling the staple are now available, and trade in the South should pick up from now on.

The Kentucky & Indiana Terminal Railroad Company, Louisville, reports that a large foundry is to be established along its line in West Louisville. John H. Rightmeyer is manager of the railroad.

The Kentucky Actuarial Bureau, Louisville, advises that the waterworks at Somerset, Hickman and Fulton, Ky., will probably be improved.

The Citizens' Lighting Company, Vine Grove, Ky., has increased its capital stock from $3000 to $5000 and will make improvements. W. E. Crutcher is the principal owner.

The Continental Utilities Company, Leitchfield, Ky., is reported to have plans for the establishment of a water plant in connection with its electric light plant. W. T. McCaskey & Co., Lansing, Mich., own the property.

The Newport Culvert Company, Newport, Ky., has been incorporated with a capital stock of $25,000 by J. B., W. N. and A. L. Andrews.

The Carlisle Electric Light & Power Company, Carlisle, Ky., plans to install an improved lighting system and make other improvements in its property.

The Kentucky River Stone & Sand Company, Lawrenceburg, Ky., has announced that it will increase its capitalization to $45,000 and will greatly enlarge the capacity of its crushed stone plant, which will be electrically operated.

The Light and Water Department, Owensboro, Ky., is receiving bids on the installation of a 250-hp. boiler.

Dresden, Tenn., has voted bonds to the amount of $15,000 for a waterworks system and $12,000 for an electric light plant.

The Harriman Cooperage Company, Harriman, Tenn., is being organized to operate a nail-keg factory.

The Nashville, Chattanooga & St. Louis Railway, general offices at Nashville, Tenn., will enlarge its blacksmith shops and install additional machinery at a cost of $30,000. A plant for the manufacture of freight cars, with an annual capacity of 1000 cars, is also to be equipped. A 4500-lb. steam hammer, bolt and nut machines and equipment for making journal bearings will be installed, among other machinery. The wheel and axle shop will be remodeled. The improvements are to be made at Nashville. H. McDonald is chief engineer.

E. R. Thomasson and W. P. Harris, Nicholasville, Ky., are equipping a garage.

The Louisville & Nashville Railroad Company, general offices in Louisville, Ky., is equipping a roundhouse and shops at Irvine, Ky., to serve the new Winchester-Irvine branch line.

St. Louis

ST. LOUIS, MO., December 7, 1914.

Although this is the period for a slackened demand in the local machine-tool business no loss is reported. Inquiry has been brought down to the irreducible minimum. This is encouragement for the belief that an improvement will set in after the holidays when the inventory period is over. Reports are coming in of steadily improving sentiment in the cotton areas tributary to St. Louis and of better banking conditions in those sections. Money rates are easier all through the Southwest and capital is more available than for many months. Altogether the feeling is optimistic. Business continues about 60 per cent. of normal in new machinery. Second-hand equipment is in slow request.

The American Car Company, St. Louis, will build a repair shop at 1525 South Vandeventer avenue and install some new equipment.

The Heil Packing Company, St. Louis, will build an addition to its cooler and add more refrigerating machinery.

The St. Louis Yacht & Boat Company, Pierce Building, St. Louis, of which Judson H. Boughton is president, recently incorporated with a capital stock of $60,000, has acquired the plant of the Sparks Boat & Engine Company, Alton, Ill., and will remove it to St. Louis and add new equipment.

The Cole-Arbogast Automobile Company, St. Louis, has been incorporated with a capital stock of $10,000 by E. W. Arbogast, Edward Ward, W. B. Hunt, William Schmidt and J. E. Bishop, and will equip a repair shop and garage.

The American Cleanser Company, Kansas City, Mo., has been incorporated with a capital stock of $75,000 by W. R. Davis, F. M. Brown and M. G. Young, and will establish a factory.

The Enterprise Cabinet Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by Hugh Huges, O. N. Evans, R. J. Evans and others, and will equip a wood-working plant.

The Salco Sand & Gravel Company, Arcade Building, Little Rock, Ark., of which M. A. Cohn is construction engineer, will install equipment for the development of sand and gravel recovery on a large tract, including a washing plant and a locomotive.

The Missouri, Oklahoma & Gulf Railway will build shops to cost, with equipment, about $200,000, at Muskogee, Okla. J. W. Dawson, Muskogee, is the engineer in charge.

The plant of the Stringtown Gin Company, Stringtown, Okla., which has been burned with a loss of $75,000, will be replaced at once.

The Foster Creek Lumber Company, Gloster, Miss., has increased its capital stock from $450,000 to $600,000 and will add new equipment.

The William Garrigue Company, Amesville, La., has been incorporated with a capital stock of $50,000 by William E. Garrigue and Edgar W. Wyatt, and will equip a cotton-seed oil mill.

The N. S. Sherman Machine & Iron Works, Oklahoma City, Okla., is reported in the market for hoisting engine, boiler, clamshell bucket and other equipment.

The Twin State Oil Refining Company, Yale, Okla., will equip an oil refinery with a daily capacity of 2000 bbl. and a pipe line of 5000 bbl. daily capacity.

H. F. Sinclair and P. J. White, Tulsa, Okla., have completed arrangements in conjunction with the Royal Dutch Shell Company to equip a pipe line and pumping stations from Oklahoma fields to Baton Rouge, La., equip a refinery and develop oil properties. Equipment to cost about $1,000,000 will be bought.

The Holderman Timber & Mfg. Company, Strang, Okla., has been incorporated with a capital stock of $15,000 by H. C. Holderman, Strang; J. M. and E. V. Simon, Morris, Okla., and will equip a wood-working plant.

Edina, Mo., has voted $20,000 in bonds for the equipment of a waterworks plant.

E. M. Stafford, Ponchatoula, La., and others will equip a box factory.

Birmingham

BIRMINGHAM, ALA., December 7, 1914.

The optimism which characterized the machinery trade for a brief period has settled to patient waiting. Very little business has resulted from the inquiries received, and transactions are far below normal. Leading machinery men are slow in expressing themselves beyond placing faith in the future.

The Tennessee Coal, Iron & Railroad Company, Birmingham, has begun excavations for the erection of a plant to manufacture fertilizer from furnace slag. The factory is to have a 10-hour capacity of 125 tons of fertilizer and to cost between $300,000 and $500,000. It will be of steel and concrete construction.

The International Agricultural Corporation, Florence, Ala., will enlarge its plant.

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The contract for the 1,250,000-bu. government grain elevator at Vancouver, B. C., has been let to the Barnett & McQueen Company, Ft. William, Ont. It will cost about $690,000.

Plans are being prepared by the New Denver Light & Power Company, Ltd., New Denver, B. C., to replace the power plant recently burned.

Cincinnati

CINCINNATI, OHIO, December 7, 1914.

Machine-tool builders, as a whole, consider the situation very much more encouraging. Foreign orders continue to come in, and while lathes are still in the lead some demand is noted for planers and milling machines. Probably the most encouraging feature is the fact that domestic inquiry is now showing considerable improvement, and probably more business is now under negotiation than for any period this year. Most of these prospective customers are located in the East, with the exception of a few automobile and auto-truck manufacturers in other sections. The railroads are still holding back, although persistent rumors are circulated that several lists will be issued shortly after the holidays.

Machinery dealers report only a slight improvement in sales; but inquiries are more numerous than for some time. Dealers in factory and mill supplies are now receiving some excellent orders from the machine manufacturers. As stocks had been allowed to be depleted in the past few months, there will doubtless be some heavy buying of supplies after inventories are taken. Apropos of this situation, at a meeting of the board of directors of the Ohio Hardware Association, held in Cincinnati last week, it was ascertained that Ohio hardware merchants have smaller stocks on hand than ever before. As business with the country merchants is close to normal, manufacturers and jobbers of hardware supplies are anticipating a record-breaking spring trade.

The Cincinnati Planer Company, Oakley, Ohio, is now working a full force of men, and some of them on overtime. It is now figuring on more domestic business than for some time past; but the majority of its orders at present are from Europe.

The Haven Malleable Castings Company, Cincinnati, has commissioned C. C. Taylor to prepare plans for an addition to its plant, 50 x 100 ft., one story, of mill construction.

The Hamilton Paper Mills Company, Dayton, Ohio, recently incorporated with $30,000 capital stock, by Milton C. Stern and others, does not contemplate the erection of a new plant. The incorporation was for the purpose of taking over the plant of the Sterling Paper Company, Hamilton, Ohio.

The Shepherd Machine Works, Newark, Ohio, is building an addition to its plant, 40 x 80 ft., one story, of brick construction, to be used for the manufacture of gasoline engines.

The plant of the Newark Artificial Stone & Plaster Company, Newark, Ohio, which was badly damaged by fire last week, will be rebuilt at once and new machinery installed.

The foundry of the Brazil Machine & Foundry Company, Brazil, Ind., that has been idle for some time, has been leased by E. D. Cameron, of Mattoon, Ill., and will be put in operation at an early date.

The Central South

LOUISVILLE, KY., December 7, 1914.

Generally quiet conditions in the machinery trade are expected to prevail during the current month, inasmuch as the tendency of buyers is to hold off until after inventory. Enough new plants are being equipped to give assurances of some immediate business. Reports agree that prospects are good and inquiries numerous. In contrast with the comparatively quiet condition of most industries, machinery houses note that many public service corporations are planning betterments, suggesting that more favorable financial conditions are having a good effect on these interests. While the cotton movement is still slow, better facilities for handling the staple are now available, and trade in the South should pick up from now on.

The Kentucky & Indiana Terminal Railroad Company, Louisville, reports that a large foundry is to be established along its line in West Louisville. John H. Rightmeyer is manager of the railroad.

The Kentucky Actuarial Bureau, Louisville, advises that the waterworks at Somerset, Hickman and Fulton, Ky., will probably be improved.

The Citizens' Lighting Company, Vine Grove, Ky., has increased its capital stock from $3000 to $5000 and will make improvements. W. E. Crutcher is the principal owner.

The Continental Utilities Company, Leitchfield, Ky., is reported to have plans for the establishment of a water plant in connection with its electric light plant. W. T. McCaskey & Co., Lansing, Mich., own the property.

The Newport Culvert Company, Newport, Ky., has been incorporated with a capital stock of $25,000 by J. B., W. N. and A. L. Andrews.

The Carlisle Electric Light & Power Company, Carlisle, Ky., plans to install an improved lighting system and make other improvements in its property.

The Kentucky River Stone & Sand Company, Lawrenceburg, Ky., has announced that it will increase its capitalization to $45,000 and will greatly enlarge the capacity of its crushed stone plant, which will be electrically operated.

The Light and Water Department, Owensboro, Ky., is receiving bids on the installation of a 250-hp. boiler.

Dresden, Tenn., has voted bonds to the amount of $15,000 for a waterworks system and $12,000 for an electric light plant.

The Harriman Cooperage Company, Harriman, Tenn., is being organized to operate a nail-keg factory.

The Nashville, Chattanooga & St. Louis Railway, general offices at Nashville, Tenn., will enlarge its blacksmith shops and install additional machinery at a cost of $30,000. A plant for the manufacture of freight cars, with an annual capacity of 1000 cars, is also to be equipped. A 4500-lb. steam hammer, bolt and nut machines and equipment for making journal bearings will be installed, among other machinery. The wheel and axle shop will be remodeled. The improvements are to be made at Nashville. H. McDonald is chief engineer.

E. R. Thomasson and W. P. Harris, Nicholasville, Ky., are equipping a garage.

The Louisville & Nashville Railroad Company, general offices in Louisville, Ky., is equipping a roundhouse and shops at Irvine, Ky., to serve the new Winchester-Irvine branch line.

St. Louis

ST. LOUIS, MO., December 7, 1914.

Although this is the period for a slackened demand in the local machine-tool business no loss is reported. Inquiry has been brought down to the irreducible minimum. This is encouragement for the belief that an improvement will set in after the holidays when the inventory period is over. Reports are coming in of steadily improving sentiment in the cotton areas tributary to St. Louis and of better banking conditions in those sections. Money rates are easier all through the Southwest and capital is more available than for many months. Altogether the feeling is optimistic. Business continues about 60 per cent. of normal in new machinery. Second-hand equipment is in slow request.

The American Car Company, St. Louis, will build a repair shop at 1525 South Vandeventer avenue and install some new equipment.

The Heil Packing Company, St. Louis, will build an addition to its cooler and add more refrigerating machinery.

The St. Louis Yacht & Boat Company, Pierce Building, St. Louis, of which Judson H. Boughton is president, recently incorporated with a capital stock of $60,000, has acquired the plant of the Sparks Boat & Engine Company, Alton, Ill., and will remove it to St. Louis and add new equipment.

The Cole-Arbogast Automobile Company, St. Louis, has been incorporated with a capital stock of $10,000 by E. W. Arbogast, Edward Ward, W. B. Hunt, William Schmidt and J. E. Bishop, and will equip a repair shop and garage.

The American Cleanser Company, Kansas City, Mo., has been incorporated with a capital stock of $75,000 by W. R. Davis, F. M. Brown and M. G. Young, and will establish a factory.

The Enterprise Cabinet Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by Hugh Huges, O. N. Evans, R. J. Evans and others, and will equip a wood-working plant.

The Salco Sand & Gravel Company, Arcade Building, Little Rock, Ark., of which M. A. Cohn is construction engineer, will install equipment for the development of sand and gravel recovery on a large tract, including a washing plant and a locomotive.

The Missouri, Oklahoma & Gulf Railway will build shops to cost, with equipment, about $200,000, at Muskogee, Okla. J. W. Dawson, Muskogee, is the engineer in charge.

The plant of the Stringtown Gin Company, Stringtown, Okla., which has been burned with a loss of $75,000, will be replaced at once.

The Foster Creek Lumber Company, Gloster, Miss., has increased its capital stock from $450,000 to $600,000 and will add new equipment.

The William Garrigue Company, Amesville, La., has been incorporated with a capital stock of $50,000 by William E. Garrigue and Edgar W. Wyatt, and will equip a cotton-seed oil mill.

The N. S. Sherman Machine & Iron Works, Oklahoma City, Okla., is reported in the market for hoisting engine, boiler, clamshell bucket and other equipment.

The Twin State Oil Refining Company, Yale, Okla., will equip an oil refinery with a daily capacity of 2000 bbl. and a pipe line of 5000 bbl. daily capacity.

H. F. Sinclair and P. J. White, Tulsa, Okla., have completed arrangements in conjunction with the Royal Dutch Shell Company to equip a pipe line and pumping stations from Oklahoma fields to Baton Rouge, La., equip a refinery and develop oil properties. Equipment to cost about $1,000,000 will be bought.

The Holderman Timber & Mfg. Company, Strang, Okla., has been incorporated with a capital stock of $15,000 by H. C. Holderman, Strang; J. M. and E. V. Simon, Morris, Okla., and will equip a wood-working plant.

Edina, Mo., has voted $20,000 in bonds for the equipment of a waterworks plant.

E. M. Stafford, Ponchatoula, La., and others will equip a box factory.

Birmingham

BIRMINGHAM, ALA., December 7, 1914.

The optimism which characterized the machinery trade for a brief period has settled to patient waiting. Very little business has resulted from the inquiries received, and transactions are far below normal. Leading machinery men are slow in expressing themselves beyond placing faith in the future.

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Reston, Man., is preparing to install electric power, etc. A. P. Power is the engineer.

The Canyon City Sawmills Company, Ltd., Creston, B. C., has erected temporary buildings at Innismore, Sask. Permanent buildings will be constructed next spring.

The Eureka Lumber Company will erect a mill at Tobacco Plains, near Elko, B. C., to replace one recently destroyed by fire. The new plant will cost $150,000 and will be capable of turning out 300,000 ft. of lumber every 20 hours. A yard system will be installed whereby the lumber will be conveyed from the mill by motor trucks automatically loaded. Electric stackers will be used in piling the lumber, and the entire equipment of the plant will be up to date in every respect.

The Northwest Lumber Company, Ltd., Edmonton, Alberta, has been incorporated with a capital stock of $500,000 to manufacture lumber, etc.

Eastern Canada

TORONTO, ONT., December 7, 1914.

Bids close January 4, 1915, with the commissioners of the National Transcontinental Railway, Ottawa, Ont., for traveling cranes for the locomotive and car shops at Quebec, Que. Plans and specifications may be seen at the office of W. J. Press, mechanical engineer, Ottawa, Ont. P. E. Ryan, Ottawa, is secretary.

The Quebec Preserving factory, 33 Smith street, Quebec, Que., which was destroyed by fire with a loss of $60,000, will be rebuilt.

Fraserville, Que., is calling for tenders for turbines to be installed in the electric light plant.

The plant of the Rathbun Company, Deseronto, Ont., has been taken over by the Deseronto General Machine Works, which will use it for the repair of marine, stationary and small locomotive engines, farm implement repairs, new and repair millwright work, boiler and sheet iron work, etc.

The Marshay Lumber Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by C. W. Wilkinson, 33 Beech avenue; H. G. McDermid, Duncan McLaren and others, to manufacture lumber, etc.

The Smiths Falls Brass & Aluminum Foundry Company, Ltd., Smiths Falls, Ont., has been incorporated with a capital stock of $60,000 by John McEwen, James MacDonald, M. G. Henniger and others, to manufacture brass, bronze, aluminum, castings and other metal specialties.

The Canadian National Carbon Company, Ltd., 12 Shuter street, Toronto, manufacturer of dry cells, etc., has increased its capital stock from $70,000 to $500,000.

The Oliver Rogers Stone Company, 1170 First avenue, West, Owen Sound, Ont., is in the market for one gyratory stone crusher, No. 6 or 7½.

The Creosoted Block Paving Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000, by R. A. Biggs, 17 Queen street, East, Toronto; C. H. Lattimore, J. L. Boyd and others, to manufacture brick, etc.

Government Purchases

WASHINGTON, D. C., December 7, 1914.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, January 19, schedule 7695, for four hydraulic rams for use on bending slab, for Boston.

The general purchasing officer of the Panama Canal, Washington, will receive bids until December 23, canal circular 882, class 1, for two stationary pillar cranes and one crane mounted on trucks, all of one-ton capacity and hand-operated.

Sealed proposals will be received by the Bureau of Yards and Docks, Navy Department, Washington, until 11 a.m., December 12, for three electric traveling shop cranes for Pearl Harbor, H. T.; until 11 a.m., January 16, for one 150-ton floating revolving crane for Norfolk. H. R. Stanford is chief of the bureau.

Sealed proposals will be received at the U. S. Engineer's Office, Pittsburgh, Pa., until noon, December 17, for furnishing lock gate engines and other lock machinery. F. R. Shunk is in charge.

The Department of the Interior, Washington, will receive bids until 2 p.m., December 15, for furnishing machinery and apparatus for remodeling the pumping plant at the Government Hospital for the Insane, Anacostia, D. C.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, November 24, for supplies for the navy yards, as follows:

Schedule 7467, Ordnance.

Class 31, Newport—Two motor-driven machines for bar-work—Bid 45, $6223.

Schedule 7468, Ordnance.

Class 32, Norfolk—Two turret lathes—Bid 106, $1200; 108, $1374.

Schedule 7469, Ordnance.

Class 33, Washington—Two turret drilling machines—Bid 108, $1970, $1947, $1954 and $1931; 203, $1425; 234, $2543; 174, $1325.

Class 34, Washington—One geared power press—Bid 12, $3940 and $3780; 26, $3375; 108, $4350; 203, $3563, $3445, $3900, $3785, $3939 and $3821; 234, $3865, $3895, $3925, $3987, $3935, $3900, $3925 and $3990; 196, $4350; 214, $2990.

Schedule 7472, Ordnance.

Class 51, Newport—One flask boring outfit—Bid 156, $11,220.

Class 52, Newport—One special machine—Bid 220, $5000.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, December 1, for supplies for the navy yards, as follows,

Schedule 7474, Yards and Docks.

Class 3, Mare Island—Three centrifugal pumps—Bid 4, $2595; 21, $2950 and $2850; 7, $3313; 78, $2550; 98, $3155; 150, $2871; 160, $2035 and $2135; 236, $2580; 252, $2375; 333, $2915 and $3286.

Alternate—Same, f.o.b. works—Bid 7, $2875; 64, $2516; 78, $2410; 98, $2690; 150, $2778 and $2492; 247, $2750; 252, $2980; 362, $2328.

Schedule 7538, Navigation.

Class 101, Annapolis—One electrically driven lathe, with spart parts—Bid 25, $1157, $1242 and $1563; 105, $1202; 111, $1268; 136, $1442; 170, $1377.40, $1258.40, $1274.40 and $1155.40; 203, $1003 and $953; 217, $1495.15; 234, $971 and $996; 257, $1113.90; 263, $591; 282, $1344; 285, $1196.

Schedule 7539, Ordnance.

Class 112, Philadelphia—One engine lathe—Bid 111, $178; 170, $133 and $148; 203, $164; 234, $130.

Class 113, Philadelphia—One upright drilling machine—Bid 103, $52.50; 111, $57; 170, $56.50, $65.75, $59.50 and $69; 177, $76.40 and $111.40; 203, $56; 234, $50.40 and $57.15.

Class 114, Philadelphia—One shaper—Bid 103, $202; 105, $212; 111, $213; 170, $212; 203, $212.75; 234, $201.65 and $198.65; 320, $232.90.

Schedule 7540, Construction and Repair.

Class 121, Norfolk—One pair buffing machines and one set of chucks—Bid 2, $744.75.

Schedule 7541, Construction and Repair.

Class 122, Philadelphia—One double-head bolt cutter—Bid 178, $570; 203, $530.75; 217, $467; 234, $517.

Schedule 7543, Steam Engineering.

Class 131, Brooklyn—One patternmakers' disk grinder—Bid 20, $670; 109, $235 and $285.50; 116, $560; 203, $600; 257, $662.50.

Schedule 7546, Steam Engineering.

Class 151, Philadelphia—One engine lathe—Bid 170, $985.33, $900 and $820; 203, $1242.45 and $965; 217, $1090; 234, $1025, $1147, $930, $960, $940, $1050 and $1087; 263, $1269; 290, $1200.

The names of the bidders and the numbers under which they are designated in the above lists are as follows:

2, Automatic Buffing Machine Company; 4, Allis-Chalmers Mfg. Company; 7, Alberger Pump & Condenser Company; 12, E. W. Bliss Company; 20, Charles H. Besley; 21, Blackall & Baldwin; 25, Aumen Machinery Company; 26, Cleveland Machine & Mfg. Company; 45, Cleveland Automatic Machine Company; 64, A. S. Cameron Steam Pump Works; 78, Diehl Mfg. Company; 98, Epping-Carpenter Pump Company; 103, Frevert Machinery Company; 105, Fairbanks Company; 106, Jones & Lamson Machine Company; 109, J. A. Fay & Egan Company; 111, E. L. Fraser; 116, Gardiner Machine Company; 136, Hendey Machine Company; 150, International Steam Pump Company; 156, Newton Machine Tool Works; 160, Jackson-Church Pump Works; 170, Kemp Machinery Company; 174, A. D. Quimp; 177, Leland-Gifford Company; 178, Linde's Machine Company; 196, D. H. Stoll Company; 203 Manning, Maxwell & Moore; 214, Toledo Machine & Tool Company; 217, Niles-Bement-Pond Company; 220, Tate-Pierce Mfg. Company; 234, D. Nast Machinery Company; 247, Platt Iron Works Company; 252, Providence Engineering Works; 257, Prentiss Tool & Supply Company; 263, Rahn-Larmon Company; 282, Wm. L. Seargent; 285, Springfield Machine Tool Company; 290, W. E. Shipley Machinery Company; 320, Universal Trading Company; 333, R. D. Wood & Co.; 362, Buffalo Steam Pump Company.

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